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SUMMARY OF RECENT ABSTRACTS*

VIII. TYPHUS GROUP OF FEVERS

General

SADUSK (p. 125) gives the incidence of fevers of the typhus group in the U.S. army during the period 1942–45.

GAUD (p. 351) reviews the literature on " Congolese red fever ", a name which has included three fevers of the typhus group, and which should be abandoned.

VAN ROOYEN and SCOTT (p. 221) examined rickettsiae by means of the electron microscope. Evidence was obtained of binary fission, and of an internal dense material surrounded by apparently fluid substance. Rickettsiae are more akin in structure to bacteria than to viruses.

BOVARNICK *et al.* (p. 832) have devised a medium in which rickettsiae can be kept alive for several hours at room temperature or at 0°C., and during the process of freezing and thawing.

GIROUD and VARGUES (p. 612) state that the rickettsia-agglutination test will give an accurate differential diagnosis of fevers of the typhus group in 80 per cent. of cases, if the test is carried out in a specialized laboratory on several occasions at intervals of a week.

In a review of immunity in certain rickettsial fevers, PARROT and PARROT (p. 344) show that there is strong evidence that the rickettsiae persist for a long time in the body, giving rise to the condition defined as premunition.

WONG and COX (p. 29) describe the original experiments on aureomycin, in which its value in rickettsial fevers was indicated. Experimental work indicates that chloromycetin has a rickettsiocidal as well as a rickettsiostatic action (GIROUD *et al.*, p. 613). It does not modify the antigenic action of the rickettsiae.

Proteus OX19 type : Vectors louse and flea
Louse typhus

Epidemiology.—Louse-borne typhus occurs in the Mediterranean coastal region of Spain, and GIMENO DE SANDE (p. 834) shows that the incidence has usually risen in March, to a peak in May. This spring incidence is probably due to overcrowding of workers engaged in harvesting sugar cane. In 1947 it was controlled by DDT, and the use of HCN. The same author (p. 835) states

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1950, v. 47. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

that in 1948 the chief method of louse control was the use of a spray of 25 per cent. DDT or Gammexane, in benzol, which proved more effective than the 10 per cent. powder used in 1947.

v. BORMANN (p. 833) made enquiries in a Russian village in which typhus had long been prevalent, and found that second attacks undoubtedly occurred, but not usually earlier than 7–8 years after the first attack. There is a high degree of immunity for about 10 years after an attack, but it is not lifelong. He (p. 1189) shows that a relatively high proportion of people in that part of Russia gave positive Weil-Felix reactions. He thinks that sub-clinical attacks probably play a great part in causing positive reactions, and result in partial immunity. In that area it was predominantly a disease of children.

Two small outbreaks of epidemic typhus are recorded by KALRA and RAO (p. 833) from refugee camps in Kashmir.

The first case of Brill's disease to be diagnosed in London is described by HAWKSLEY and STOKES (p. 970), and in a note on this case FELIX (p. 971) draws attention to the need for standardization of the technique of the Weil-Felix reaction. WORMS (p. 833) reports 3 sporadic cases of typhus in Paris, which were probably of the Brill type, and were the result of a flare-up of a persisting infection. In a study of 14 cases of Brill's disease in the United States, MURRAY *et al.* (p. 729) found that the Weil-Felix test was either negative, or positive to only low titre ; complement fixation tests were always high, and were higher with epidemic than with murine antigen. Lice could easily be infected by feeding on the patients, which suggests that such people, if living in a louse-infested community, could initiate outbreaks of typhus, but MEGAW comments that there does not appear to be any record of typhus among contacts in hundreds of cases reported in the United States. The disease is not so mild as is generally believed.

Aetiology ; transmission.—GÖNNERT (p. 221) describes the various forms of *R. prowazeki* seen in stained films of the intestines of infected lice. NYKA (p. 531) has found rickettsiae in the blood of mice and rats infected with murine or classical typhus, and has seen in blood from typhus patients organisms very suggestive of rickettsiae.

CROCKER *et al.* (p. 617) have made a study of 4 strains of rickettsiae received from Russia from cases of Siberian tick typhus, which, clinically, resembles boutonneuse fever. The strains caused scrotal reactions in 40–50 per cent. of male guineapigs, and cross-immunity tests showed that these strains could not be differentiated from *R. prowazeki.* If these are really the agents of Siberian tick typhus the question arises if *R. prowazeki* can be maintained in the rodent-tick-rodent cycle.

KRYŃSKI and CZUCZWAR (p. 126) show that 0·05 per cent. phenol kills *R. prowazeki* in 24 hours, and 0·5 per cent. in 1 hour. Copper sulphate is very toxic to *R. prowazeki*, even in a dilution (0·002 per cent.) which is not toxic to lice (KRYŃSKI and WOYCIECHOWSKA, p. 1074).

STARZYK (p. 222) shows that sheepskin coats from " typhus carriers " may retain material infective to lice and guineapigs for more than a year.

FULLER *et al.* (p. 127) have devised a method for inducing lice to feed on blood and other suitable fluids through a membrane prepared from a chick 1–7 days old. By this means they have maintained a healthy colony for 2 weeks. WEYER (p. 1074) discusses the intracoelomic infection of lice with *R. mooseri* and *R. prowazeki.*

Pathology ; clinical findings.—SIEGERT (p. 345) produces evidence in favour of the view that rickettsial toxins play an important part in the pathology of typhus.

The serum of rabbits repeatedly given injections of *Proteus X19* was found by BIELING and OELRICHS (p. 344) to be capable of inhibiting the infectiousness

of *R. prowazeki*. The same authors (p. 345) show that sera from rabbits immunized with *R. prowazeki* or *R. mooseri* protect equally (but moderately) against both strains. Although convalescent serum from patients who have not been inoculated against typhus will protect rabbits against moderate infections, serum from patients who have been inoculated will do so much more strongly. BIELING and OELRICHS (p. 345) show that the protective action bears no relationship to the Weil-Felix titre.

DONZELOT and KAUFMANN (p. 613) record 23 cases of infectious endocarditis which they regard as due to typhus. There were special features, such as negative blood culture, resistance to penicillin and (in the few cases treated) response to aureomycin which, in patients all of whom had had typhus, indicate the aetiology. It is possible that there was an associated streptococcus infection (DONZELOT *et al.*, p. 971). WORMS *et al.* (p. 971) also report a case of malignant endocarditis apparently due to typhus, which the patient had several years before.

Treatment.—Treatment of typhus with *p*-aminobenzoic acid was not successful in the hands of RUIZ SANCHEZ (p. 972), who found that aureomycin was the drug of choice, though chloromycetin was also very valuable. DANA *et al.* (p. 1074) used chloromycetin successfully in louse-borne typhus.

Vaccination.—Towards the end of the war the preparation of the Weigl vaccine was re-started in Poland. TOMASZEWSKI (p. 127) describes the severe reactions which are observed in a small minority of persons given this vaccine ; these may be serious in people with liver diseases.

KALRA and SPEECHLY (p. 834) found that after injection of Cox-type vaccine only a proportion of subjects reacted to the Weil-Felix test, and to the complement-fixation test. There was no exact correspondence between the two tests, and no correlation of titres.

Strain E of *R. prowazeki*, isolated in 1941, lost its virulence after 16 passages in egg yolks, and has since been used as a live vaccine by CLAVERO DEL CAMPO and PEREZ GALLARDO (p. 222) in animals and man. The immunizing power in animals was good and the reactions to inoculation in man were not excessive.

Flea typhus

Epidemiology.—The incidence of positive complement-fixation tests for murine typhus in Bombay rats of several species is discussed by SOMAN (p. 1190). Murine and scrub typhus were found there by BHANSALI and KOTHARI (p. 614). In the Jubbulpore area of India, KALRA and RAO (p. 835) found murine typhus and a case of tick typhus in the troops. A murine strain was isolated from the tick *Boophilus australis*, for the first time, and this opens the question of transmission of this rickettsia by ticks. *Trombicula deliensis* was common on forest rodents, but no case of scrub typhus was seen.

Complement-fixation tests for murine typhus were positive in 12 species of animals in Georgia, U.S.A., but MORLAN *et al.* (p. 458) show that the proportion infected was small. ORTIZ MARIOTTE *et al.* (p. 973) state that murine typhus is endemic in a large town in Mexico. CALERO (p. 26) reports 6 cases of murine typhus from Panama. For the first time *R. mooseri* has been identified in Brazil (TRAVASSOS *et al.*, pp. 128, 346).

Clinical findings ; treatment.—Among 17 persons in Rio de Janeiro with serological evidence of murine typhus, PEREIRA and TRAVASSOS (p. 1076) found that 7 gave positive reactions for syphilis, which is a significantly higher rate than in a large group showing no evidence of typhus.

The blood picture in murine typhus is described by SCAFFIDI and CALI' (p. 128).

The pathological changes in a fatal case of murine typhus are described by WOOLF (p. 974) ; the most striking lesion was acute diffuse myocarditis.

Treatment of murine typhus with aureomycin was very successful, whether started early or comparatively late ; the optimum dose seems to be 50–100 mgm. per kgm. daily, for 36–48 hours (KNIGHT *et al.*, p. 458). CUTILEIRO (p. 1191) also reports success with aureomycin. In the treatment of a laboratory infection with murine typhus in a man of 71 years, MARTIN *et al.* (p. 974) used aureomycin and then chloromycetin, with success, but after treatment had been continued for 12 days a condition probably of ariboflavinosis developed, which has often been seen in patients treated with these substances. Chloromycetin is successful in the treatment of murine typhus (LEY *et al.*, p. 836).

In a test of 315 chemicals for their activity against *R. mooseri* in chick embryos, ROBBINS *et al.* (p. 973) found 25 which caused prolongation of the average time of survival of the infected embryos by one day or more. Half of these were already known to be effective, but activity was observed for the first time in 12.

Proteus OXK type : Vector mite

A new endemic area of scrub typhus is reported from Japan by THOMPSON (p. 223).

AUDY (who has written practical notes on scrub typhus (p. 458)) and his companions (p. 1076) studied the rats and mites (*T. deliensis*) on an uninhabited island in the Malacca Straits, where many years ago a visiting party had contracted the disease. He (p. 27) gives an account of the ecological features of scrub typhus, which is more closely associated with damp grass, especially tall *lalang* grass, than with scrub. Forest clearings, forest fringes and especially abandoned village sites favour the vector mites and their rat hosts, particularly during and after the wet season. TRAUB and FRICK (p. 616) agree that mite populations increase greatly after heavy rainfall.

TRAUB (p. 348) shows that *T. deliensis* was present in all batches of mites in Assam and Burma from which *R. orientalis* was isolated, and formed 88 per cent. of the mites in those batches. The rat *R. flavipectus yunnanensis* is important as a host, but shrews also are hosts, and two strains of rickettsiae have been isolated from their mites. For the first time, TRAUB *et al.* (p. 1077) have recovered *R. orientalis* from *Rattus mülleri*, *R. edwardsi* and one of the *R. rajah* group, and from the trombiculid mite *Euschöngastia indica*. It seems that this disease may involve a number of species of small mammals and mites.

In an investigation of an outbreak of scrub typhus in Batavia, GISPEN (p. 615) failed to find *R. orientalis* in large numbers of mites (*Euschöngastia indica*), ticks, fleas and lice from rats and shrews, but obtained it from *Rattus r. diardi*. The low infection rate in rats corresponds with the low *Trombicula akamushi* index. He (p. 836) concludes that *Trombicula akamushi* is the vector there, not *T. deliensis* as in Sumatra.

WHARTON (p. 224) describes the mite vectors of scrub typhus.

ROONWAL (p. 28) has published a long paper on the mammals studied in relation to scrub typhus in the Assam-Burma war theatre in 1945. A guide to the domestic rats of Malaya has been prepared by HARRISON (p. 614). *Rattus r. diardi* is concerned in murine typhus, and *R. r. argentiventer* in scrub typhus and probably leptospirosis. He (p. 224) writes of the effect of rain on the feeding of *Rattus r. argentiventer*.

There are striking antigenic differences between strains of *Rickettsia orientalis*, and FOX (p. 27) has found, in an examination of 8 strains, that they fall into 4, or possibly 5, groups distinguishable by neutralization tests. The subject is interesting from the point of view of epidemiology, and important for the development of effective vaccines. Investigations by BENNETT *et al.* (p. 223) gave similar results.

O'Connor and McDonald (p. 976) show that specific antigens can be detected in the urine of patients with scrub typhus, in the first few days of the disease, and describe the test by which this is done. The test is apparently specific.

Unusual, and transient, neurological signs are described by Rao (p. 976) in two patients with scrub typhus.

Smadel *et al.* (p. 129) describe the successful treatment of 69 cases of scrub typhus with chloromycetin. The drug has a powerful rickettsiostatic action, but when it is given early in the disease, and then discontinued, there may be relapse. This probably occurs when the rickettsiostatic action has worn off before the immunizing mechanism of the body has become adequate to suppress further development of the rickettsiae. Relapses may be avoided if two or more courses are given, with smaller doses. Relapses were found in patients with scrub typhus who were given chloramphenicol or aureomycin in single doses or in doses given on one day only, early in the disease (Smadel *et al.* p. 616). Smadel (p. 837) sums up his experiences with chloromycetin in scrub typhus, noting particularly the frequency of relapses in volunteers in whom treatment was started about 3·4 days after onset, and the absence of relapses in patients infected in nature, in whom treatment was started about 7·1 days after onset. There is evidently an element of immunity in the response to chloromycetin. Giles and Symington (p. 348) successfully treated 15 cases of scrub typhus by giving a single dose of 3 gm. chloromycetin ; this seems to be adequate unless there is no obvious improvement in 10–12 hours ; in that case additional doses of 0·25 gm. can be given every 3 hours to a total of 6 gm. This treatment was given relatively late, not before the 7th day.

Smadel *et al.* (p. 615) show that administration of chloramphenicol in doses of 3 or 4 gm. at intervals of one week was not enough to suppress completely some signs and symptoms of scrub typhus in volunteers exposed to infection though these were slight. The first dose was given on the last day of exposure to infection.

Plooij (p. 837) treated scrub typhus successfully with para-aminobenzoic acid.

Trial of a scrub typhus vaccine by Berge *et al.* (p. 349) in Japan gave no evidence that it had any value in preventing or modifying the disease.

Indeterminate type : Vector tick

A case of boutonneuse fever contracted in Ile-de-France is reported by Fouquet and Morin (p. 841), who successfully treated the patient with chloromycetin.

Pellissier and Trinquier (p. 459) describe 26 cases of a tick-borne rickettsial fever in French Equatorial Africa, in which the Weil-Felix reaction was indeterminate, the rickettsia-agglutination reaction often positive with *R. prowazeki*, and the rickettsiae did not show cross immunity with boutonneuse fever or murine typhus. No definite conclusion was reached about the identity of the rickettsiae, but it was thought that the vector was *Rhipicephalus sanguineus*. Strains of rickettsiae have been isolated from a dog and from a tick (*R. sanguineus*) in French Equatorial Africa ; Pellissier *et al.* (p. 617) think that they were of the boutonneuse-Rocky-Mountain group.

Evidence of damage to liver and kidneys in Rocky Mountain spotted fever is given by Wolff and Harrell (p. 351).

Successful treatment of tick-borne typhus with chloromycetin is reported by Carson *et al.* (p. 225) and Reilly and Earle (p. 1191) for the Rocky Mountain fever group ; by Cameron (p. 730) in Kenya ; and de Magalhães *et al.* (p. 839) in Brazil. Success with aureomycin is also reported by Reilly and Earle (p. 1191) ; Henderson *et al.* (p. 977) in Kenya ; Cutileiro (p. 1191)

and DE MAGALHÃES *et al.* (p. 839) in Brazil. CUTILEIRO used 2 gm. on the first day and 1 gm. on the following days, and suggests that these are as effective as heavier doses, which should be reserved for more serious cases. In spite of the success of these substances, DE MAGALHÃES *et al.* consider that the best defence is the control of ticks by the modern insecticides.

ORTIZ MARIOTTE and VARELA (p. 225) prepare vaccines against tick-borne typhus by using ticks instead of yolk-sac preparations. They prefer *R. sanguineus* for this purpose.

LACKMAN *et al.* (p. 224) describe a rickettsia recovered from *Amblyomma maculatum*, which belongs to the Rocky Mountain fever group, but is not identical with any other known rickettsia of that group.

Q fever

Q fever is very widespread. Cases have been reported from England (MACCALLUM *et al.*, p. 226 ; MANDERSON, p. 347) ; Switzerland (MÄKINEN-FOREL, p. 839) ; Germany (FREYGANG, p. 346 ; MAYER, p. 347 ; SEIGERT *et al.*, p. 1077) ; Portugal (FONSECA *et al.*, p. 532) ; Spain (DE PRADA *et al.*, pp. 460, 533) ; Turkey (PAYZIN, p. 129) ; South Africa (GEAR *et al.*, p. 977) ; and the United States (DODDANANJAYYA, p. 130 ; BRAWLEY and MODERN, p. 348 ; BELL *et al.*, p. 618 ; SIGEL *et al.*, p. 1078).

Transmission by ticks has been studied. PARKER and SUSSMAN (p. 130) have found *Rhipicephalus sanguineus* spontaneously infected ; in Spain PEREZ GALLARDO *et al.* (p. 840) isolated *R. burneti* from ticks collected from calves and dormice, namely *R. sanguineus*, *R. bursa* and *Hyalomma marginatum*. PARKER *et al.* (p. 460) isolated the rickettsiae from *H. savignyi* in Spain, and DE PRADA *et al.* (p. 533) report isolation from ticks found on animals at the Madrid slaughter house. In Algeria and Morocco natural infection has been found in *H. mauritianicum* (*Rapport Institut Pasteur, Maroc*, p. 227).

Transmission by the bites of larval, nymphal and adult *Amblyomma cajennense* has been proved by DE RODANICHE (p. 227). WEYER (p. 619) shows that *R. burneti* can be transmitted by *Ornithodorus moubata*, and that the faeces and coxal fluid of infected ticks may contain the rickettsiae. It is possible that virulence and infectivity may be enhanced by passage through ticks.

The part played by cattle in the epidemiology of Q fever has attracted much notice. In England MACCALLUM *et al.* (p. 226) recovered *R. burneti* from raw milk, and in Germany MAYER (p. 347) reports an outbreak of 28 cases ; all except 4 of these patients were butchers, and infection was probably acquired from the excrement of infected cattle. BLANC *et al.* (p. 130) have successfully infected a heifer, a young bull, 2 dogs, a camel, and 2 kids. LUOTO and HUEBNER (p. 730) found *R. burneti* in placental tissues of cows found to have complement-fixing antibodies. Infected placentas allowed to remain on the ground and to become desiccated may be responsible for spread of infection to man and cattle, and the hides of new-born calves are likely to be contaminated, and to be a source of infection in slaughter houses and hide-plants.

BELL *et al.* (p. 618) found positive complement-fixation reactions in 488 of 9,804 persons in California ; the rates were especially high in those who worked with cattle or their products. DODDANANJAYYA (p. 130) found positive tests in beef cattle which had been out to pasture (and to exposure to ticks) in California, but not in dairy cattle which had not been out.

In Turkey, tests show that Q fever is present throughout, in sheep, goats, cattle and man, especially in persons in contact with animals (PAYZIN, p. 129). JELLISON *et al.* (p. 731) found *R. burneti* in milk from ewes in California, and in 2 persons in whom infection seemed to have originated from sheep. In a wool-

processing factory in the United States an outbreak was probably caused by inhalation of infected dust (SIGEL *et al.*, p. 1078). CAMINOPETROS (p. 534) thinks that *R. burneti* from sheep and goats are a distinct variety, for which he uses the name *R. burneti* var. *caprina*.

MACCALLUM *et al.* (p. 226) call attention to the danger of handling infected tissues and material from patients who have died of pneumonia, or who have atypical pneumonia ; they describe how a pathologist and other persons present at an autopsy of a patient who died from Q fever themselves became infected. HARMAN (p. 226) gives details of these cases. KIKUTH and BOCK (p. 227) and SIEGERT *et al.* (p. 1077) describe laboratory infections, probably due to inhalation of infected particles. One laboratory worker was febrile for 2 months and during this period he infected people in hospital with him ; his sputum was infective for 5 months. DEUTSCH and PETERSON (p. 840) also report infection apparently transmitted from a patient to his visitors. BEEMAN (p. 534) reports two cases of Q fever in persons looking after the room and bed linen of a lodger employed in preparing Q fever antigen at the National Institute of Health, U.S.A. The infecting agent must have been present in the clothing, shoes, hands or hair of the lodger, who was not himself ill, though some of his colleagues were. Laboratory workers should wear, and change, adequate coverings in the laboratory.

Studies on the complement-fixation reaction in Q fever are reported by GERMER and HENI (p. 460).

The pathological findings in a fatal case of Q fever are described by WHITTICK (p. 731). There was consolidation of the lung, and there were areas of softening in the brain.

FONESCA *et al.* (p. 532) give a detailed account of the clinical features of 20 cases of Q fever observed in Portugal, and of the results of experimental infection of 45 mental patients, and of apes. MANDERSON (p. 347) notes that a patient with Q fever had frank haemoptysis for 3 days. An outbreak of Q fever in a mental hospital in Geneva is described by MÄKINEN-FOREL (p. 839) ; pulmonary involvement occurred in 40 per cent., and a scarlatiniform rash in about 50 per cent. of the patients. In an outbreak of Q fever in part of Württemberg, where 100 cases occurred in a rural population of 3,000, one of the patients had mild encephalo-meningitis, which suggests that *R. burneti* has neurotropic as well as pneumotropic characters (FREYGANG, p. 346). In 50 cases of Q fever treated by MOESCHLIN and KOSZEWSKI (p. 1191) there were 9 in which extra-pulmonary complications arose (thrombophlebitis with pulmonary embolism, epididymitis, encephalitis, pancreatitis). In severe attacks the patient should be kept under observation for 3–4 weeks after defervescence.

BRAWLEY and MODERN (p. 348) make the point that although in one series of 93 patients admitted to a U.S. hospital with influenza-like symptoms or atypical pneumonia or fever of undetermined origin there were 20 in whom the complement-fixation test for Q fever was positive, in another series of 201 there were only 6. Each series covered 11 months.

Successful treatment of Q fever with chloromycetin is described by ZARAFONETIS and BATES (p. 840). Aureomycin has been used successfully by LENNETTE *et al.* (p. 30) and by HAUSS and SIMROCK (p. 348).

Members of the staff of the Viral and Rickettsial Diseases Laboratory in California were vaccinated against Q fever. MEIKLEJOHN and LENNETTE (p. 1192) show that booster doses of vaccine are needed every 3 months. No cases of Q fever occurred in the vaccinated, though unexplained rises in complement-fixation titre suggested sub-clinical infection. The one unvaccinated member of the staff was attacked by Q fever.

Rickettsialpox ; Trench Fever

Rose (p. 349) gives a description of rickettsialpox, of which nearly 500 cases have been reported in New York. He makes the point that the Weil-Felix test was always negative, but the complement-fixation test with ether-extracted soluble antigens gave rising-titre responses, and with Rocky Mountain spotted fever antigen it was always positive. Rickettsiae have been isolated in mice and in yolk-sac cultures. On the other hand, in the series of 12 cases reported by Barker (p. 350), only 4 sera contained complement-fixing antibodies against Rocky Mountain spotted fever, and these in very low titre.

A general account of the epidemiology of trench fever has been written by Kostrzewski (p. 841).

Mooser *et al.* (p. 534) studied the skin lesions produced in rabbits and man after intracutaneous or percutaneous application of suspensions of intestines of lice infected with *R. quintana.* Fever was induced in the human volunteers, and papules at the site of inoculation, and papules were caused in rabbits.

Charles Wilcocks

MALARIA

Haas, W. Zur Frage der provozierten Malaria tertiana. Eine klinisch-epidemiologische Studie. [**The Question of Provoked Benign Tertian Malaria.**] *Deut. Gesundheitswesen.* 1950, Dec. 28, v. 5, No. 52, 1641–3. [13 refs.]

Investigations were made on clinical and epidemiological grounds on some 600 cases of benign tertian malaria, to ascertain to what an extent accidental provocation could induce manifestations of this infection. Most of the complicating and intercurrent illnesses exerted no provocative effect. A curious epidemiological observation, namely the simultaneous recurrence of malaria attacks in several members of the same family, could not be attributed to any provocative cause. Rather we should regard this as evidence of a protozoal latency of tertian malaria which is activated by the same provocative stimulus. Among these causes the disturbances to the body and mind involved in the migration of populations play their part. *P. Manson-Bahr*

Rico-Avello y Rico, C. La epidemia de paludismo de la postguerra. [**The Post-War Epidemic of Malaria.**] *Rev. Sanidad e Hig. Pública.* Madrid.. 1950, Oct., v. 24, No. 10, 701–37, 4 figs.

This paper opens with a brief summarized account of outstanding events in the long history of malaria in Spain. Figures representing the morbidity and mortality attributed to malaria during each year of the first half of the present century are given in a graph. No great reliability attaches to these figures : the official antimalaria campaign was only started in Spain in 1920 and malaria was made a compulsorily notifiable disease as recently as 1943. Nevertheless the curve reproduced serves to illustrate the general trend of malaria incidence during the fifty years. When the century opened some 4,000 deaths a year were attributed to malaria in Spain. Thereafter the endemic declined in intensity until the first world war when there was a marked rise in malaria morbidity and mortality. From 1920 onwards an organized antimalaria campaign rapidly produced results. In 1936 there were only 170 deaths attributed to malaria and 42,757 cases. Then followed the civil war. Malaria incidence increased and assumed alarming proportions during the post-war

years 1939–1943. In 1943 there were 424,414 malaria cases reported : malaria mortality reached its maximum in 1942, with 1,781 deaths. The malaria morbidity rates in the worst affected provinces during the 1939–43 epidemic were Cáceres 103 per 1,000 ; Badajos 60 ; Huelva 33 ; Córdova and Toledo 29 and Jaen 25. Provinces along the northern coast had very few cases and these mostly imported. The two Provinces Burgos and Almeira were completely free from malaria.

Plasmodium vivax is the predominant parasite in Spain : in 1936 it was responsible for 95·4 per cent. of infections ; *P. falciparum* 3·7 and *P. malariae* 0·9 per cent. By 1942 the prevalence of *P. falciparum* had increased : the relative incidence in that year was *P. vivax* 89·9 ; *P. falciparum* 8·8 ; *P. malariae* 0·01 ; and mixed infections 1·2 per cent.

The author discusses at length the factors responsible for this post-war epidemic, movements of population, civil and military, arrival of foreign troops, war destruction, disorganization of health services, scarcity of antimalarial drugs, malnutrition, scarcity of food, destruction of cattle resulting in man being bitten by normally zoophilic races of *A. maculipennis*, etc.

A map illustrates recent information regarding the geographical distribution of *Anopheles* species in Spain. *A. maculipennis atroparvus* is predominant in the most malarious provinces. Species with a limited distribution are *A. maculipennis labranchiae*, *A. maculipennis subalpinus*, *A. hispaniola*, *A. algeriensis*, *A. plumbeus*, *A. marteri*, *A. multicolor* and *A. sergenti*.

A short account is given of the measures being taken to control malaria and of the success already achieved. *Norman White*

Schwetz, J., with the collaboration of H. Baumann & M. Fort. Notes paludologiques sur les lacs Albert et Kivu. [**Malariological Notes on Lake Albert and Lake Kivu.**] *Inst. Roy. Colonial Belge Bull. des Séances.* 1951, v. 22, No. 1, 191–201.

During the course of a Schistosomiasis Mission carried out by the author in 1949, blood smears, and thick drip preparations and mosquitoes were collected at several places on the banks of Lake Albert and Lake Edward as well as at Blukwa near the summit of the high bank of Lake Albert. The material thus collected was examined at the Parasitology Laboratory of the Brussels University.

Blukwa has an altitude of about 1,800 metres, which approximates the upper limit of the distribution of the vectors *A. gambiae*, *A. funestus* and *A. marshalli*. The blood of 100 infants in Blukwa was examined : all were free from malaria parasites. The blood of one mother out of 20 examined harboured scanty *P. falciparum*. The only anophelines found were *A. christyi* and *A. demeilloni* : the capacity of either of these species to transmit malaria is very problematical.

Blood films from three villages on the Kasenyi Plain, Lake Albert, were examined. This area had been surveyed by the author ten years previously. It is an area of low malaria endemicity. The parasite rates were lower than on the previous occasion though no antimalarial measures have been taken : none is needed. *A. gambiae*, *A. funestus* and *A. pharoensis* are all found in this area, their relative prevalence changing with the seasons.

Films were collected from two African co-operative fisheries on Lake Edward at Vitshumbi in the south and Kyabinionge in the north. They revealed a state of low endemicity. Parasite rates were fairly high but parasites were few. The maximum infection rate was not attained until the sixth year of age. The infections were mostly by *P. falciparum* ; *P. malariae* was rare ; only two

P. vivax parasites were found. All these findings contrast markedly with those found in hyperendemic areas. *Norman White*

MONTALVAN, J. A. Paludismo en el Ecuador. [**Malaria in Ecuador.**] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil. 1948, Jan.–June, v. 5, Nos. 1 /2, 47 pp., 3 maps & 2 graphs.

This monograph contains an adequate description of the geography, climatology and demography of the Republic of Ecuador. Triangular in shape, the country straddles the Equator ; the base of the triangle is the Pacific coast-line, and the apex juts into Brazil. Colombia borders it on the north and Peru on the south. It covers an area of some 300,000 square kilometres and has an estimated population of three and a half millions. The two parallel ranges of the Andes traverse the country from north to south and determine the three natural subdivisions of the country with very diverse characteristics. The low-lying coastal area comprises 5 of the 17 provinces into which the republic is divided. The inter-Andean area contains 10 provinces lying some 2,000–3,000 metres above sea-level. The two eastern provinces are forest-covered and have been little explored : here rise numerous rivers which flow into the Amazon. The eastern provinces cover 387,710 square kilometres but their population is estimated to be only some 188,000. Nearly two-thirds of the total population of the country live in the inter-Andean provinces.

The statistical information supplied does not allow an assessment of the importance of malaria as a public health problem. From 5 to 10 per cent. of deaths from all causes are attributed to malaria both in Guayaquil and in the country as a whole. Rural figures of causes of mortality are but little trust-worthy. In recent years, however, a number of special inquiries have been carried out. In the Province of Guayas, in the littoral, the ratio of malaria deaths to total mortality was 11·5 per cent. : in Los Rios (littoral) 10·28 ; in Manabi (littoral) 19·5 ; in Esmeraldas (littoral) 25·14 ; in El Oro (littoral) 16·65 ; in Azuzy (inter-Andean) 19·94. The spleen indices in these provinces were 13·0, 22·1, 5·5, 29·2, 16·1, and 44·5 respectively. These spleen indices were determined at different seasons of the year and are not strictly comparable.

In the low-lying provinces *P. falciparum* infections are predominant ; *P. malariae* infections vary from 3 to 5 per cent. of the total. In the inter-Andean provinces *P. vivax* is most prevalent, and *P. malariae* infections are much more frequent. In one place *P. malariae* was found in 50 per cent. of the positive blood films.

The two important vectors are *A. albimanus* and *A. pseudopunctipennis* : *A. punctimacula* plays a subsidiary rôle. *A. albimanus* is the predominant species in the coastal and all low-lying districts. It breeds in a great variety of casual collections of water and from February to May inclusive its prevalence is enormous. Fortunately however *A. albimanus* is not a very efficient vector ; it has a preference for animals other than man as the source of its food supply and it is short-lived in the climatic conditions prevailing. The transmission season is short, from the end of January to the end of May : major outbreaks of malaria occur generally in April and May. As a general rule *A. albimanus* is not found at elevations over 300 metres above sea-level. In one place, however, it was found breeding at a height of 1,500 metres.

Above 300 metres *A. pseudopunctipennis* predominates. It breeds chiefly in clear running water. It breeds throughout the year and malaria transmission may occur at any season. It is a much more efficient vector than *A. albimanus*, having a much greater tendency to bite man.

Recently a start has been made with the use of DDT as a measure of control, beginning in Guayaquil, by far the largest centre of population, and a few other places in the coastal area. *Norman White*

Pará, M. Dados estatísticos de viscerotomia sôbre doenças de condições mórbidas do homem no Brasil. 2. Malária no período de 1937–1946. [**The Distribution of certain Diseases in Brazil as indicated by Data obtained through Viscerotomy. II. The Incidence of Malaria Lesions in Material collected from 1937–1946.**] *Mem. Inst. Oswaldo Cruz.* 1950, v. 48, 293–339, 2 figs. (1 folding map). [12 refs.] English version 341–9.

During the period 1937–1946 the number of samples of liver material obtained by viscerotomy in Brazil was 267,107. Of these, evidence of malaria was found in 16,559, 6·2 per cent. for the country as a whole. Evidence of malaria is based on the finding of characteristic pigment in the liver. Difficulty may be occasioned in cases of schistosomiasis. " Although, as a general rule, the microscopic aspect of the malaria pigment insures its identification, it seems to us that in the presence of characteristic lesions of schistosomiasis, it is hazardous to diagnose malaria on the basis of the mere presence of a granular pigment of a darker hue." Cases of this nature have been omitted from the statistical report presented.

Liver samples were obtained in 1,174 counties : of these, 991, 85 per cent., yielded malaria positive specimens. The results are set out in tabular form and a map gives in graphic form the intensity of malaria infection in different parts of the country. Malaria incidence is high in the north and north-east parts of the country, including the whole Amazon valley. Incidence is moderate in the mid-west, in the States of Espirito Santo and Rio de Janeiro in the Eastern Meridional region, and in the State of Paraná in the South. Incidence is mainly low in the remainder of Brazil. *Norman White*

Schiavi, A. & de Mello, V. H. Incidência da malária quartã no Estado de São Paulo (Brasil). (Até 31 de dezembro de 1947.) (Com apresentação de 61 casos novos.) [**Incidence of Quartan Malaria in the State of São Paulo, Brazil, up to December 31st 1947, with a Report of 61 New Cases.**] *Arquivos de Hig. e Saúde Pública.* S. Paulo. 1949, v. 14, Nos. 39, 40, 41 & 42, 61–8, 1 map. English summary.

The authors have collected together all cases of *P. malariae* indigenous malaria that had been reported up to the end of 1947 in the State of São Paulo, and tabulated them according to the districts in which they occurred. They numbered 99. To these are added 61 cases which have been discovered by the State Malaria Prevention Service. A spot map illustrates the distribution. Quartan malaria is a very rare disease throughout the interior of the State. Eighty per cent. of all cases were found in three *municípios* in the north of the east coast of the State, Caraguatatuba, São Sebastião and Ilhabela. Out of 3,500 positive blood films examined from this area *P. malariae* was found in 2·9 per cent. *Norman White*

Mackie, T. T., Simpson, T. W. & Tuttle, R. L., with the assistance of J. Kluttz. **A Malaria Reconnaissance in the Dominican Republic.** *J. National Malaria Soc.* 1951, Mar., v. 10, No. 1, 44–56, 1 fig.

This malaria survey was carried out on four sugar estates on the southern coast of the Dominican Republic, east of the capital Ciudad Trujillo. The coastal plain is an extensive coral shelf. The sugar estates, some 3 to 5 kilometres

from the coast, extend inland to the foothills of the central range of mountains. Between the northern limits of the cane fields and the mountains there is a strip of undeveloped land containing swamps, small ponds and numerous small lagoons, many of which hold water throughout the year. The indigenous population is collected in small scattered villages close to the lagoons. The labour population in the cane fields are housed near wells. The climate is subtropical with little seasonal variation. The rainy season extends from midsummer to the end of November during which the monthly rainfall varies from 6 to 11 inches. In the dry season the rainfall rarely exceeds 2 inches a month.

The people are of mixed Spanish origin, more Spanish than Negro in appearance and culture.

The object of the inquiry was to obtain information about the incidence of malaria in the labour population and the season of maximum transmission. The first observations were made in summer at the beginning of the rainy season, 1949. The second group of observations was made in the late autumn and winter of the following year. Altogether 4,656 children were examined for splenic enlargement : blood films from 4,592 of these children were also examined.

At the beginning of the rainy season the spleen index was 3·6 per cent. (1,817 children). At the end of the rainy season the spleen index was 6·6 (2,839 children). Parasite indices at these two seasons were 2·3 and 7·8 per cent., respectively. *Plasmodium falciparum* was found in 82·4 per cent., *P. malariae* in 17·5 per cent. and *P. vivax* in 4·9 per cent. of the positive blood films.

Only two species of *Anopheles* were found, *A. albimanus* and *A. grabhami*. Larvae of *A. albimanus* were found along the edges of lagoons, in borrow pits, and along the edges of river and streams, all exposed to sunlight. Larvae of *A. grabhami* were found in only two streams near the foothills, in shaded areas.

The overall picture is one of low endemicity but there were two villages in which spleen and parasite indices were between 30 and 40 per cent. These villages were close to the northern limits of the plantations, near the foothills, close to streams and in an area of maximum rainfall. As a general rule both indices decreased as one approached the sea coast. *Norman White*

LEVADITI, C. La phase exo-érythrocytaire des hématozoaires du paludisme. [**The Exo-erythrocytic Phase of Malarial Plasmodia.**] *Rev. Paludisme et Méd. Trop.* 1951, May 15, v. 9, No. 84, 121–38, 18 figs. [28 refs.]

The author begins by relating the fortuitous discovery (*C. R. Soc. Biol.*, 1932, v. 109, 343) by himself and Mlle. SCHOEN in 1931 of the merocysts of *Hepatocystis* (=*Plasmodium*) *kochi* in the liver of a baboon from Kindia. At that time, it was thought that these structures might have some affinities with *Encephalitozoon*, and their connexion with a malaria parasite in the blood of the animal was not considered. He then traces the gradual solution of the mystery of the third developmental cycle (*i.e.*, the tissue phase) of the plasmodia from the time of Grassi to the present day, classifying the cycles of development as follows :—

1. Pre-erythrocytic schizogony or primary tissue phase : initial development of the sporozoite in the vertebrate host.
2. Erythrocytic schizogony.
3. Exo-erythrocytic schizogony or secondary tissue phase—inconstant.
4. Sexual cycle (*a*) gametocytes in the blood and (*b*) sporogony in the insect.

P. C. C. Garnham

Dymowska, Z. Rasy *Anopheles maculipennis* Meig na terenie miasta Warszawy w latach 1942–1943. [**Races of *Anopheles maculipennis* in Warsaw in 1942–43.**] *Med. Dośw. i Mikrob.* Warsaw. 1950, v. 2, Nos. 3/4, 599–610, 3 charts. [16 refs.]

The English summary appended to the paper is as follows :—

" In Warsaw and vicinity two races of *Anopheles maculipennis* have been stated. They differ from each other by the shape and colour of their eggs and construction of their air spaces.

" Maxillar index for *messeae* is 15·9, for *typicus* 14·8. Both races were found at the same time in all examined places."

Bruce-Chwatt, L. & Fitz-John, R. A. **Mosquitoes in Crab-Burrows on the Coast of West Africa and their Control.** *J. Trop. Med. & Hyg.* 1951, June, v. 54, No. 6, 116–21. [12 refs.]

This is a useful contribution to knowledge on the ecology of littoral crabs on the West African coast and the problems presented by the breeding of mosquitoes in their burrows. The observations were made in the vicinity of Lagos, Nigeria. A table provides the scientific and the common name of eight of fifteen species of West African seashore crabs. Some of these are not concerned in burrowing ; others make small burrows and depressions in the *Rhizophora* red mangrove swamps between daily tides ; two of the most important from the point of view of mosquito-breeding are *Gelasimus tangeri* (the fiddler crab) and *Cardiosoma armata* (the edible land crab) which make deep burrows in the *Avicennia*, or white mangrove, zone. This is flooded only twice a month by the tides. Both crabs also invade dry land behind the white mangrove belt.

The fiddler crab may form a 3–4-feet shaft, terminating in a large chamber ; 150–200 burrows per 100 square feet of ground are not unusual. The burrows of the edible land crabs are fewer but may reach to depths of 7 feet, and are frequently tortuous before ending in a chamber of about 1,500 to 2,000 ml. capacity. Quantities of brackish alkaline water in these burrows may be as much as 500 ml.

In West Africa, no material damage has been done to the bunds of the drainage system by any of these crabs. On the other hand, chironomids, *Cyclops*, and numerous species of mosquito occur in the burrows of, particularly, the fiddler and the giant land crab. Species recorded in the larval stage are :— *Aëdes* (*Aëdimorphus*) *irritans* and *nigricephalus ; Uranotaenia annulata* and *U. bilineata ; Culex thalassius, C. cinerellus, C. rima, C. tigripes, C. decens* and *C. fatigans ; Aëdes aegypti* and *Anopheles gambiae* (*melas*). Most of these, and rarely *Aëdes africanus* and some other species, were also taken as adults in the burrows. *Aëdes aegypti* and *Anopheles gambiae* (*melas*), besides some others, occurred as adults even during the dry season. In this season only about 10 per cent. of burrows harbour mosquitoes, but in the rains, the proportion rises to 40 or 50 per cent. Of 150 burrows examined in some detail during the late rains, 1, 4 and 4 contained larvae of *Culex fatigans, Anopheles gambiae* (*melas*) and *Aëdes aegypti* respectively, with an average of 20 to 35 larvae per burrow. The deep burrows appear to provide " outdoor " shelters for adults of *gambiae* in the dry season ; the shallower depressions of another crab (*Sesarma africanum*), the hairy lagoon crab of the mangrove belts, constitute more important breeding sites for this anopheline. The amount of breeding of *Aëdes aegypti* in crab burrows is considered to be negligible in practice. The biting habits of the prolific crabhole breeders *Aëdes irritans, Aëdes nigricephalus*, and *Culex thalassius* create a substantial public health problem.

Promising results in destroying the crabs have been obtained by dropping balls of calcium carbide (1-inch diameter) into burrows. The entrance is blocked and, within 15 minutes, the crabs are dead owing to the acetylene fumes released. Two boys can treat 500 crab holes in a day.

Control of mosquito breeding has been successfully carried out, by adding to each burrow a 1-inch ball made of a dough-like mixture of 1 part P520 Gammexane wettable powder (6·5 per cent. gamma isomer), 3 parts cement, 7 parts of sand, and water to the required consistency. Crab-holes treated once in this way ceased to harbour any *Aëdes irritans* larvae (formerly very numerous) for 3½ to 5 months. One pellet remained effective for 4½ months when used in tree-holes in the vicinity. *D. S. Bertram*

DE BUSTAMANTE, F. M. Observações com a armadilha "Dawn Trap" de Shannon na baixada fluminense. [**Observations with Shannon's "Dawn Trap".**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1950, Apr. 30, v. 2, No. 2, 153–9, 4 figs. on 2 pls.

The English summary appended to the paper is as follows :—

"1. The authors present the results of their observations with Shannon's dawn trap for the capture of anopheline mosquitoes in the counties of Magé and Itaguay, state of Rio de Janeiro. In 7 traps were made 623 captures in which 42,390 specimens of *Anopheles* were caught.

"2. Shannon's dawn trap showed good for the capture of *A. tarsimaculatus* (=*A. aquasalis*) as well as for *A. albitarsis* and several other species of *Anopheles*. It seems to be a good trap for all the zoophilic species of *Anopheles*.

"3. Only 3·90 per cent. of the total specimens caught were found in the stable compartment after sun rise. For the *A. tarsimaculatus* this percentage was still lower (1·92 per cent.)."

DO AMARAL, J. P. & AGUIAR, A. A. Reações da precipitina em alguns Culicidas. [**Precipitin Reactions in certain Mosquitoes.**] *Mem. Inst. Butantan.* 1949, v. 22, 205–9, 1 fig. on pl. English summary (7 lines).

The English summary appended to the paper is as follows :—

"In laboratory bred mosquitoes, fed with human blood, the precipitin tests are positive in samples killed 12 hours after feeding and preserved in dried state one year (the largest period observed in the present work).

"Typical reactions are easily read within 5 minutes.

"Mosquitoes killed 24 hours to 3 days after the blood meal still show clear cut reactions, though presenting a zone of turbidity on the upper part of the ring."

TSUCHIYA, H. & MCCOY, J. E. **A Method of preserving Unstained Thick Film.** [Research Notes.] *J. Parasitology.* 1951, June, v. 37, No. 3, 320.

The authors stored dried thick blood films in a wooden box (capacity, 25 slides). The lid and seams were sealed with Scotch tape and the box wrapped in at least 2 or 3 large sheets of Cellophane and tightly sealed. The package was then wrapped in water-repellent hard paper, sealed and stored at 5°C. in the refrigerator. After 3 weeks of storage, any moisture which had condensed on the slides was removed at room temperature as in the original preparations.

When the slides were stained with dilute Giemsa solution, it was found that malaria parasites retained their characteristic morphology and staining properties. Moreover, the loss of parasites during the 3 weeks of storage was very small. Fifteen counts were made before and after the storage period

and it was found that the average count per cmm. was 31,611 parasites at the beginning and 27,998 at the end of storage, which was a negligible loss.

The method is suggested as an aid in instruction where fresh material is not readily available. *H. J. O'D. Burke-Gaffney*

VAN NOORT, Hendrik Roelof. **De betekenis van malaria voor kinderen en de waarde van het miltonderzoek voor de malariabestrijding.**

This book was reviewed on p. 843.

ZSCHUCKE, J. Zur Frage der 'Virulenz' der griechischen Malaria und der Wirksamkeit der verschiedenen Verfahren der Atebrinprophylaxe. [**The "Virulence" of Malaria in Greece.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, Apr., v. 2, No. 4, 485–91. [35 refs.]

The author denies that malaria in Greece is more virulent than elsewhere. His experiences in other Mediterranean countries show that malarial infections are not more resistant to treatment in Greece than in the Pyrenees, Sardinia, or North Africa.

Neither is there any evidence that the plasmodia are more resistant to chemotherapy.

Failure of daily prophylaxis with 0·06 gm. atebrin [mepacrine] is admitted and is attributed to dosage insufficient to raise the blood level high enough to destroy the schizonts. *P. Manson-Bahr*

NOYAN, A. Die klinischen Formen der Malaria in der Türkei. [**Clinical Forms of Malaria in Turkey.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, Apr., v. 2, No. 4, 491–7, 2 figs.

The author, who has had some 40 years' experience in military and civil hospitals in Turkey, has seen all varieties of mild and severe malaria in times of peace and war. These he classifies into chronic, latent, larval, masked, anaphylactic, cachectic, pernicious, blackwater fever, and clinical malaria without parasites in the peripheral blood.

The anaphylactic form declares itself by urticaria or Quincke's oedema of the face or other portions of the body ; sometimes even by bronchitic asthma. Illustrative cases are cited.

He records that in 1916 he had under his care 34 patients with splenomegaly in Baghdad. In the spleen puncture preparation he found typical malaria gametocytes ; but in 12 Leishman-Donovan bodies were present. [There is a cryptic reference to the discovery of exo-erythrocytic stages at this time, but this inference is not borne out by the two photomicrographs which illustrate this paper.] *P. Manson-Bahr*

SEAL, S. C. *Plasmodium vivax* **Infection causing Allergic Symptoms.** *Calcutta Med. J.* 1951, Apr., v. 48, No. 4, 127–8.

A Bengali Hindu of 23 suffered from fever on alternate days for a week. On the third day, joint pains and an itching urticarial rash appeared. The rash subsided with the remission of fever and reappeared with its rise, lasting for about 4 hours. The condition apparently responded at first to calcium gluconate and adrenaline injections. The patient remained free from symptoms for a fortnight, after which a second similar attack occurred. On this occasion examination of the blood revealed the presence of a " fair number " of " B.T. malarial parasites ".

The patient responded rapidly to proguanil : fever and allergic symptoms ceased after 24 hours and so remained for the last 14 months. No parasites were found on repeated blood examinations during the first few weeks after treatment.

Nothing in the family or dietetic history suggested any source of an allergic reaction. The patient stated that he had had his only other attack of malarial fever three years before and that " his blood slide did show M.T. malarial parasites ".

The author suggests that the association of the malarial infection with the allergic symptoms is shown by the disappearance of the latter after a course of proguanil. He also suggests that the allergic state was brought about by " a relapse of his previous and the only attack of malaria three years ago " [but there is no evidence that " B.T. malarial parasites " were found on that occasion].

Reference is made to a somewhat similar case recorded by MUKHERJEE and MITRA [this *Bulletin*, 1950, v. 47, 954]. *H. J. O'D. Burke-Gaffney*

CASILE, M. Lésions de l'artère fessière par injections intramusculaires de quinine. [**Damage to the Gluteal Artery by Intramuscular Injections of Quinine.**] *Rev. Paludisme et Méd. Trop.* 1951, Mar. 15, v. 9, No. 82, 58–61. [20 refs.]

A study of reported cases and some personal observations have induced the author to call attention to the damage to the gluteal artery that may result from intramuscular injection of quinine into the buttock. Such accidents are of four kinds. (1) The artery may be transfixed without any injection of quinine into the lumen of the vessel : a haematoma or even a traumatic aneurism, with possible eventual suppuration, may result. (2) Arterial ulceration in a quinine abscess cavity. Haemorrhage which may be very severe, and very difficult to control, may follow the incision of such an abscess. (3) Lesions resulting from the injection of quinine into the lumen of the artery : this may be followed by necroses in the tissues supplied by the branch of the artery involved. (4) Repeated injections damage arterioles, leading to fibrous degeneration of muscular tissue (residual nodules); the vessel walls become fragile so that trivial trauma may produce haematomata of considerable size.

It follows that intramuscular injections of quinine, if absolutely necessary, should be carried out with punctilious regard to the well known rules regarding asepsis, choice of site for the injection, and the rest. *Norman White*

JOSEPHSON, E. S., TAYLOR, D. Jane, GREENBERG, J. & RAY, A. P. **A Metabolic Intermediate of Pamaquine from Chickens.** *Proc. Soc. Exper. Biol. & Med.* 1951, Apr., v. 76, No. 4, 700–703, 1 fig. [12 refs.]

It is known from the work of previous authors that pamaquin (plasmoquine) and the related pentaquine and isopentaquine are inactive *in vitro* against certain plasmodial species. It has been noted, however, that a solution of pamaquin acquires activity *in vitro* on being kept for some time. ZUBROD *et al.* [this *Bulletin*, 1948, v. 45, 962] found that in the vertebrate host the substance was almost completely metabolized. The nature of the metabolites has been described by HUGHES & SCHMIDT and by BRODIE & UDENFRIEND respectively [*ibid.*, 1950, v. 47, 965 ; 1951, v. 48, 14] but they were not accurately defined chemically. It has been shown by the present authors (unpublished) that extracts of blood, tissues and faeces of chickens treated with pamaquin, apparently in the absence of the parent substance, possess antimalarial

properties. An investigation was therefore made of the character of the metabolic products of the drug. For this purpose chickens were given a single oral dose of the substance. Extracts of tissues provided extremely small amounts of material so only the results obtained with faecal material are described. Ethylene dichloride was used for their extraction over periods of 30 minutes and the solvent was then washed with buffer at *p*H 8·8, and extracted into N/10 HCl, partial purification being effected with the aid of countercurrent distribution. No measurable amounts of the parent substance were present in the extracts. Antimalarial activity greater than that of pamaquin was shown *in vitro* by the small amount of material extracted and the formation of methaemoglobin from chicken blood was similarly greater. The properties of the metabolite described by the present authors apparently did not correspond with those found by the authors mentioned above. It resembled closely a substance obtained by irradiation of pamaquin with ultraviolet light. The available evidence showed that it was similar in properties to an 8-amino-5 : 6-quinoline quinone. *J. D. Fulton*

DE LUCENA, D. T. Tratemento da malária pelo camoquin. [**Treatment of Malaria Infection with CAM-AQ1 (Camoquin).**] *Rev. Brasileira Med.* Rio de Janeiro. 1950, Sept., v. 7, No. 9, 588–92. English summary.

This is a record of the treatment of 48 patients suffering from malaria with camoquin : 47 had primary infections. All were treated in their homes in rural areas. The drug was given in tablet form after food. Each tablet contained 0·2 gm. camoquin. Two tablets were given to children aged 0–4 years ; three tablets to children 4–8 years ; four tablets to children 8–12 years ; five tablets to older children and adults. Children received these amounts in two doses with a six-hours' interval : adults received the five tablets as a single dose. There were 29 *P. vivax* infections (9 in adults), 16 *P. falciparum* infections (10 in adults) and 2 *P. malariae* infections. The fever was rapidly controlled in all cases. *P. vivax* had disappeared from the blood of adults 24 hours after treatment ; parasites persisted somewhat longer in children. Trophozoites of *P. falciparum* disappeared within 48 hours in both adults and children but gametocytes persisted much longer. Four of the 20 children with *P. vivax* infections relapsed : one of the 10 adults with *P. falciparum* infections had a relapse. Mild symptoms of drug intolerance, diarrhoea and vomiting, occurred in two cases. *Norman White*

HOEKENGA, M. T. **The Treatment of Malaria with a Single Dose of Camoquin.** *Amer. J. Trop. Med.* 1951, Jan., v. 31, No. 1, 139–43. [14 refs.]

This study concerns the treatment of 325 persons suffering from malaria, resident in or near La Lima, Honduras. Here malaria is endemic throughout the year ; *A. albimanus* is the chief vector. The patients were treated in the United Fruit Company's hospital at La Lima. All the patients were of mestizo stock : their ages ranged from 7 to 56 years : 90 per cent. were males. There were 160 *P. falciparum* and 165 *P. vivax* infections. The only antimalarial treatment each received was a single dose of camoquin, either 1·0, 0·8, 0·6 or 0·4 gm. of base.

Disappearance of fever occurred rapidly in all but a few cases. For the 160 *P. falciparum* cases the average interval to cessation of fever was 17·1 hours, with variations from 13·2 hours (1·0 gm. dose) to 18·7 hours (0·4 gm. dose). For the 165 *P. vivax* cases the average interval was 15·8 hours with no appreciable difference between dosage groups.

The average interval between medication and the disappearance of parasites was 29·2 hours for the *P. falciparum* cases and 26·4 hours for the *P. vivax* cases irrespective of the size of the dose.

The only relapses noted were in two patients with *P. falciparum* infections, each of whom had received only 0·4 gm. camoquin. In both patients parasites reappeared four days after their disappearance consequent upon camoquin therapy : retreatment with camoquin was followed by apparent cure.

Only 3 of the 325 patients vomited after taking the drug. The tablets were retained when the dose was repeated, so it is probable that malaria rather than the drug was responsible for the vomiting. *Norman White*

Clemo, G. R. & Popli, S. P. **Synthesis of possible Antimalarials. Part II. Compounds with the *iso*Quinoline Ring attached to the Quinuclidine System.** *J. Chem. Soc.* 1951, June, 1406–9.

Kermack, W. O. & Storey, Nora E. **Attempts to find New Antimalarials. Part XXX. The Synthesis of Derivatives of Quinolino(4′ : 3′-2 : 3)quinoline.** *J. Chem. Soc.* 1951, June, 1389–92.

Crowther, A. F., Curd, F. H. S., Davey, D. G., Hendry, J. A., Hepworth, W. & Rose, F. L. **Synthetic Antimalarials. Part XLVII. N^1-3 : 4-Dihalogenophenyl-N^5-alkyl- and -N^5N^5-dialkyl-diguanides.** *J. Chem. Soc.* 1951, July, 1774–80.

Crowther, A. F., Curd, F. H. S. & Rose, F. L. **Synthetic Antimalarials. Part XLVIII. The Action of Halogens on N^1-Aryldiguanides.** *J. Chem. Soc.* 1951, July, 1780–85.

Pizzillo, G. Profilassi chininica e prove all'acido fenico del Castellani per evidenziare la chinina nelle urine. [**Quinine Prophylaxis of Malaria and Castellani's Carbolic Acid Test for the Presence of Quinine in the Urine.**] *Riv. di Malariologia.* 1951, Apr., v. 30, No. 2, 81–95. English summary.

With references to past history and to the *obiter dicta* of authorities, many of whom belong to a past generation, the author reinforces his contention that circumstances may well arise in which quinine will be able to play a valuable part in the mass clinical prophylaxis of malaria. For this purpose quinine should be administered in daily doses of 0·4 gm. during the whole period of exposure to infection. At the end of such period therapeutic reactivation of infection with adrenaline should be carried out in all cases.

For the control of the adequacy of mass quinine prophylaxis the use of Castellani's carbolic acid test for the detection of quinine in the urine is recommended as simple and reliable. *Norman White*

Janssens, P. G., Verstraete, N. & Sieniawski, J. Essais de chimioprophylaxie antipaludique collective chez les enfants des travailleurs des mines de Kilo. [**Trials of Collective Antimalaria Drug Prophylaxis among Children of Mine Workers at Kilo.**] *Ann. Soc. Belge de Méd. Trop.* 1950, June 30 & Sept. 30, v. 30, Nos. 2 & 3, 257–86 ; 449–78.

Previous attempts at antimalaria drug prophylaxis among the Kilo mine workers recruited on the high plateaux, and their families, had met with no success. Quinine, atebrin [mepacrine] and paludex had been tried : insufficient dosage, irregular administration and other difficulties contributed to the lack of success. In the renewed attempts now reported attention has been concentrated on the child population : atebrin, paludrine [proguanil] and

chloroquine have been used. Microscopic examination of blood preceded drug prophylaxis in all cases.

The first experiment with atebrin was carried out on the children of African laboratory assistants and of African members of the antimalaria teams. These children were easily controlled ; they numbered 112, of ages, at the beginning of the experiment, from 10 days to 14 years. The duration of the experiment was 29 months, with a break in the 7th and 8th months caused by lack of atebrin. The drug was given twice weekly, 0·025 gm. (¼ tablet) at ages 0–2 ; 0·05 gm. 2–10 ; 0·1 gm. above 10.

Before the experiment the parasite index of these children was 90·5 ; gametocyte index 35·7 ; spleen index 60·3. These indices among 351 infants of various mining camps of the region were 90·6, 39·9 and 62·3 per cent., respectively.

During the period of drug administration no parasites could be found in the blood of the majority of the children. During the interruption of medication in the 7th and 8th months the blood of 65 children was examined : 32 remained free from parasites ; 28 had *P. falciparum* infections, 6 with gametocytes ; 2 had *P. malariae* infections ; 2 mixed *P. falciparum* and *P. malariae* infections ; one infection unidentified. Excluding these infections observed during the temporary cessation of medication, there were only 12 infections noted, in 10 children, during the whole period of observation.

After the cessation of the experiment, nearly all the children had attacks of malaria 2 to 3 months later. All such attacks responded well to treatment ; there were no deaths from malaria and no blackwater fever.

The general condition of the children improved remarkably during the period of drug administration.

Subsequently a similar experiment was carried out on 129 children of workers in a mining camp throughout a year. The results were comparable with those obtained in the previous group.

The conclusions are that atebrin in small doses twice weekly is a satisfactory antimalarial prophylactic both in hyperendemic and in endemic conditions ; that with the doses employed premunition develops satisfactorily—there is an inhibition of parasites, not a radical cure which in the circumstances might be dangerous ; that children submitted to such prophylaxis enjoy better health than children left to develop their own resistance to malaria unaided ; that the procedure is cheap. The necessity to distribute the drug twice a week entails a degree of supervision, however, that is difficult to assure in mining camps.

Comparable experiments to those above were made with paludrine given in tablet form, each tablet containing 0·1 gm., ¼ tablet for ages 0–2 ; ½ tablet for ages 2–10 ; 1 tablet for ages over 10. The drug was given once or twice a week. Children in camps in both endemic and hyperendemic areas were treated. The results were encouraging. Among 381 children in a hyperendemic area the parasite index before medication twice a week was 84·5 per cent. After 3 months of medication it was 9·0, and after 8 months 9·4 per cent. The infections seen during medication were light. Another group of 151 children were given the drug once a week : the parasite index before medication was 81·8, from which it fell to 38·9 after 3 months and to 18·5 after 8 months. The corresponding gametocyte indices were 40·9, 22·2 and 15·4 per cent., respectively. A third group were given double the doses mentioned above, once a week. The results obtained were almost identical with those obtained with the smaller doses.

It is concluded that paludrine in the doses specified, once a week, is sufficient prophylaxis for schoolchildren in areas of normal endemicity : given twice a week it completely controls malaria in such areas. In hyperendemic areas

the weekly administration effects a 50 per cent. reduction in the number of blood infections, and reduces the intensity of such infections as persist to a subclinical level, but in such areas the administration twice a week has definite advantages. Clinical relapses and clinical reinfections can be almost eliminated.

Further experiments, on a still larger scale, were carried out with chloroquine. Altogether some 2,000 children were treated with this drug. Tablets, each containing 0·25 gm. chloroquine diphosphate, were used, half a tablet for infants up to 2 years of age, one tablet for older children, once a week. The trials were carried out in both endemic and hyperendemic areas and everywhere gave " perfect results ". The authors consider it to be the drug of choice for the mass prophylaxis of African children in the mining camps, but it is costly. The Management of the Kilo-Moto Gold Mines have considered the expense well justified and for five or six months drug prophylaxis has become generalized among almost all the labourers' children. The infant mortality rate of the Kilo mines has fallen from 265 to 91 per thousand. *Norman White*

Lipparoni, E. Epidemiologia malarica e lotta antimalarica nella zona del villaggio Duca degli Abruzzi. [**Malaria Epidemiology and Antimalaria Campaign in the Neighbourhood of the Village, Duke of Abruzzi, Italian Somaliland.**] *Riv. di Malariologia.* 1951, Apr., v. 30, No. 2, 57–73. English summary.

The village Duca degli Abruzzi is the centre of an agricultural development area in Italian Somaliland where work was started some thirty years ago by the Italian Somaliland Agricultural Society. Here came the first Italian colonists determined to surmount the obstacles of climate and pestilence in founding a settlement and reclaiming bushland. It is situated on a plateau 110 metres above sea-level on the Uebi Scebeli River. The irrigated land lies in a curve of the winding river, on its left bank, and covers an area of 16 by 14 kilometres. On the right bank of the river there is an asphalt road which links the village with Mogadiscio 90 kilometres away. There is also a railway line. There are some 10,000 Africans living in the immediate vicinity of the development area, and 30,000 in the surrounding country which is administered by the authorities in Duca degli Abruzzi.

The author, with 20 years' experience of malaria work in this area, gives much information about the climate and the abundant facilities for the breeding of anophelines. *A. gambiae* is the chief vector. *A. funestus* is of much less importance. *A. pharoensis* and *A. mauritianus* are relatively rare. *P. falciparum* is responsible for 76 per cent. of infections, *P. vivax* for 23 per cent. *P. malariae* is rare. The spleen index of the native population is around 80 per cent. and the parasite rate from 65 to 70 per cent.

During the last 2½ years antilarval measures combined with the use of residual insecticides, DDT and Gammexane, have reduced the anopheline density in Duca degli Abruzzi and in the surrounding three kilometres to a minimum. DDT spraying alone has markedly decreased anopheline density in villages within a 16-kilometre radius, but not to the extent that it has decreased in the village. European immigrants now run very little risk from malaria : moreover they live in mosquito-proofed dwellings and paludrine [proguanil] is widely used as a prophylactic. Antilarval and antiadult measures combined have reduced malaria morbidity among the native population by about 50 per cent. In such protected areas no infections can now be found in African infants during the first year of life. Very good results have been obtained by the prophylactic administration of paludrine to small groups of Africans.

Apart from antimalarial work the agricultural improvements have contributed much to the health and well being of the local African population.
Norman White

MONTALVÁN C., J. A. Campaña nacional antipalúdica en la República del Ecuador. [**Antimalaria Campaign in the Ecuador Republic.**] 1950, Aug., 82 pp., 55 figs., 2 maps & 5 graphs. Dirección General de Sanidad Instituto Nacional de Higiene "Leopoldo Izquieta Perez", Guayaquil, Ecuador.

This is the story of the creation of a National Antimalaria Service as an extension of the activities of the Leopoldo Izquieta Perez National Institute of Hygiene in Guayaquil, with the object of procuring the eradication of malaria from Ecuador by the use of DDT. A new pavilion was built in the Institute to serve as headquarters of the Service. To facilitate the supervision and execution of the work the Country was divided into four regions or zones : (1) Northern Zone comprising the coastal province of Esmeraldas and adjacent malarious valleys of inter-Andean provinces ; (2) a zone including the coastal province of Manabi and extending from the sea to the Andes including mountain areas of low elevation ; (3) a zone including the whole river basin of the river Guayas which comprises the provinces of Guayas and Los Ríos and parts of Manabi, Pichincha, Cotopaxi, Bolivar, Chimborazo, Cañar, and Azuay, and the province of El Oro ; (4) a southern zone comprising the malarious valleys of the inter-Andean provinces of Cañar, Azuay and Loja and malarious parts of the eastern province of Santiago Zamora. The Service has concentrated its efforts in zones 2, 3 and 4 : work in the northern zone is being undertaken by an Interamerican Co-operative Service. In each of the three zones the work is controlled by a specially trained malariologist. The author, who is the Director of the National Institute, is in charge of the whole campaign.

During 1949 two courses of instruction for the training of altogether 50 subordinate personnel were organized in the Institute. A detailed survey was first made of the whole territory to be treated. The zones were divided into sectors, each containing from 2,000 to 2,500 dwellings. In each sector a team of workers under a trained inspector collected all information regarding the location of dwellings, their population, types of construction, rivers, roads and other means of communication, etc. These data were recorded on maps and plans, samples of which are attached to the report. An assortment of motor transport, a motor launch, a motor boat, canoes, mules and horses were procured. Forty-four teams or "brigades" were employed on the work.

For the DDT spraying both mechanically and hand-operated sprays were provided. Solutions of DDT in kerosene and DDT emulsions have both been used. In some places Gammexane was tried. In the coastal provinces and in valleys of Azuay and Loja, a total of 101,613 dwellings (with a population of 616,737) were sprayed between the 20th November 1949 and the 2nd March 1950. In the coastal area, including Guayaquil, the chief malaria transmission season is from the middle of January to the middle of May.

It is not possible yet to assess the results of the campaign, but hospital, laboratory and dispensary returns already indicate a noteworthy reduction of malaria morbidity.
Norman White

REID, J. A. **A Laboratory Method for testing Residual Insecticides against Anopheline Mosquitos.** *Bull. Entom. Res.* 1951, Apr., v. 41, Pt. 4, 761–77, 7 figs. [18 refs.]

The author in Malaya has developed a method of testing residual insecticides for control of anopheline mosquitoes in the laboratory, but as near as possible to

practical conditions. The mosquitoes are allowed to emerge into a small reservoir cage (9-inch cube) from a bowl of pupae : from this they can make their way into the main testing cage ($2 \times 1\frac{1}{2} \times 1\frac{1}{2}$ ft.), the sides of which can be covered with panels treated with insecticide. From the main cage, the insects can escape to a " light trap " guided by a dim light, as suggested by the work of Muirhead Thomson [this *Bulletin*, 1948, v. 45, 482].

Nearly all the work was done with *Anopheles vagus* reared from wild larvae, but some confirmatory tests were done with *A. maculatus*. Preliminary tests without insecticides showed that, in total darkness, *A. vagus* tends to fly upwards ; it will also fly towards a dim light (but not vertically downwards). Activity was greatest at dusk. Similar reactions were shown by *A. maculatus*, but the tendency to fly into the light-trap was not so strong. Neither mosquito would feed if a guineapig was kept in the main cage and it appears that they are motivated by attempts to escape.

The following insecticidal treatments on the main cage were tested at intervals up to 16 weeks :— DDT at 200 mgm. /sq. ft. (from a 33 per cent. wettable powder) ; gamma BHC at 40 mgm. /sq. ft. (from a 5 per cent. wettable powder) ; chlordane at 200 mgm. /sq. ft. (from a 50 per cent. wettable powder). The results are consistent with those of earlier workers. The order of initial toxicity was BHC > chlordane > DDT ; and of persistence was DDT > BHC > chlordane. DDT never killed more than 85 per cent. mosquitoes, but after 16 weeks it still killed 35 per cent. Gamma BHC killed all at first but the mortality fell below 30 per cent. in 7 weeks. Chlordane killed 98 per cent. at first and this figure fell to 30 per cent. in 5 weeks. The percentage of mosquitoes living long enough to fly into the light trap increased, in all cases, as the insecticides got older. In only one test was a live mosquito found in the main cage by morning. Of those in the light trap, a considerable number died on the day following the experiment after DDT or BHC tests, but not from chlordane or control tests. Rather more females were killed than males.

Similar tests conducted with *A. maculatus* gave comparable results, but throughout, *maculatus* was more easily killed (possibly because it spent longer in the main cage).

Some repellent tests published earlier through Dr. Field [this *Bulletin*, 1950, v. 47, 785] were repeated and the repellent and lethal effects of BHC at a distance were confirmed. On the other hand, the repellency which was first reported for DDT as well, was not substantiated in later tests with that insecticide.

J. R. Busvine

Hawking, F. & Thurston, June P. **A Strain of Monkey Malaria** (*Plasmodium cynomolgi*) **made resistant to Proguanil** (**Paludrine**). *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, June, v. 44, No. 6, 695–701. [16 refs.]

A preliminary account of the preparation of a strain of *P. cynomolgi* made resistant to proguanil has been given by Hawking and Perry [this *Bulletin*, 1949, v. 46, 219]. The infection was maintained in *Macaca mulatta* monkeys, by infected blood or passage through *A. maculipennis atroparvus*. Proguanil acetate was given subcutaneously at the start but caused necrosis at the site of infection so a stomach tube was used. The maximum tolerated dose by mouth was approximately 40 mgm. per kilo on 8 successive days, or double this amount on 4 alternate days. The strain of *P. cynomolgi* was very sensitive to the drug and parasites could be made to disappear by a fraction of a milligramme per kilo over a few days, the minimal effective dose being about 0·12 mgm. given on 4 successive days. In relapses produced by splenectomy the blood was similarly cleared as in the early stages of treatment. Resistance was produced by giving subcurative doses, dosage being repeated each time parasites reappeared

in the blood. By this method resistance was noted after 6 months and was maximal after 16 months, having then increased some thousand-fold, and remained unaffected by blood or mosquito passage or by freezing at —76°C. for 3 weeks. Resistance of pre-erythrocytic forms and of gametocytes was observed. The sensitivity of the proguanil-resistant strain to sulphadiazine remained unaltered. *J. D. Fulton*

THURSTON, June P. **Morphological Changes in *Plasmodium berghei* following Proguanil, Sulphadiazine and Mepacrine Therapy.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, June, v. 44, No. 6, 703–6, 8 figs.

The changes in morphology, percentage of abnormal forms and effect on parasite numbers of *P. berghei* in mice following treatment with the drugs named in the title, are described. These substances were given to the host in amounts slightly above the " minimum effective dose " previously determined by the author [this *Bulletin*, 1950, v. 47, 1183] and their effect on three stages of the parasites, rings, trophozoites, and schizonts was followed in stained films prepared at 3-hour intervals during the day. Proguanil and sulphadiazine appeared to act chiefly on the early schizonts and affected the dividing nuclei, causing the break up of chromatin. The ring forms continued development to the trophozoite stage, the distribution of the pigment in the latter being affected. The changes occurred in 5 to 6 hours after drug treatment in this asynchronous infection. After 30 to 40 hours' contact with the drug, all forms of the parasite were affected. Morphological changes were produced at all stages by mepacrine. The clumping of the pigment after mepacrine was noteworthy and the cytoplasm was affected more than the chromatin. The changes are illustrated in 7 drawings. *J. D. Fulton*

MCFADZEAN, J. A. **Morphological Changes in *Plasmodium cynomolgi* following Proguanil, Sulphadiazine, and Mepacrine Therapy.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, June, v. 44, No. 6, 707–16, 5 graphs & 8 figs.

In this investigation similar observations were made on *P. cynomolgi* to those described above for *P. berghei*. The former parasite resembles *P. vivax* and gives rise to a fairly synchronous infection in *Macaca mulatta* monkeys. Detailed study was made in two animals treated with various small doses of proguanil (fractions of a milligramme per kilo.) and in two others treated with 0·25 gm. sulphadiazine per kilo. orally. The changes produced by mepacrine in another monkey were used for comparison. Blood films were made before treatment and subsequently at 3-hour intervals during the day till the blood was free from parasites. The latter, for purposes of record, were divided into 2 categories—an early stage including ring and small amoeboid forms and a late stage consisting of large amoeboid forms and schizonts. The changes produced by proguanil and sulphadiazine occurred in parasites in which chromatin had begun to divide and caused its break up to irregular clumps and cytoplasm stained abnormally. In the case of mepacrine, changes were observed in young trophozoites. The paper is illustrated by several diagrams and graphs. *J. D. Fulton*

GALLIARD, H. & LAPIERRE, J. Infection à *Plasmodium berghei* chez le rat blanc. [*P. berghei* **Infection in White Rats.**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 3/4, 185–94, 4 figs.

The course of infection of *Plasmodium berghei* in white rats of different ages and weights is described. The younger and lighter the rat, the more severe

is the disease. In rats of 50 grammes weight or less, half die, after an "incubation" of the parasite of 3 days and a parasitaemia lasting 3 weeks; the survivors become cured after a month. The "incubation" is a day or so longer in older and heavier rats, the infection is less intense, the anaemia is less marked, and fewer animals die. In rats of 250 grammes, the infection is very mild and lasts only a fortnight. Leucocytosis is a feature of all these infections, the polymorphonuclears showing the greatest increase, though sometimes the number of eosinophiles also becomes raised. If the rats are splenectomized a few days before infection with the parasite, the disease is even more rapid and fatal, particularly in the youngest groups of rats. Splenectomy of rats apparently cured of the disease (*i.e.*, rats whose blood was unable to infect mice) provokes a relapse 4 or 5 days later. This relapse is less severe than the primary attack but otherwise shows similar characters, *e.g.*, marked leucocytosis, cure after 3 weeks.

Various attempts on a small scale to immunize animals against *P. berghei* were made; the gut contents of *Rhodnius prolixus* which had fed on infected mice 24 hours or more previously were inoculated into white mice. The mice were later infected with viable parasites in the ordinary way—all became infected and the disease followed an unmodified course. Galliard had previously shown that intradermal injection of parasites failed to infect animals—accordingly 3 rats were given on 3 occasions intradermal inoculations in an attempt to immunize them. Eight days after the last intradermal injection, intraperitoneal inoculation was made—2 rats responded normally, but the third exhibited a delayed incubation and a mild and short course though with an excessive polymorphonuclear leucocytosis. Injections of male hormone (sterandryl) to infected rats caused no modification of the disease. Immunization of mice by inoculating them with serum from cured rats is being attempted, but no exact results have been obtained yet. *P. C. C. Garnham*

RODHAIN, J. Le comportement du "cotton rat" vis-à-vis du *Plasmodium berghei*. Note complémentaire. [**The Behaviour of the Cotton Rat towards** *P. berghei*.] *Ann. Soc. Belge de Méd. Trop.* 1951, Apr. 30, v. 31, No. 2, 289–96, 2 figs. on pl.

The author gives additional information about infections of three strains of *Plasmodium berghei* in cotton rats [see also this *Bulletin*, 1950, v. 47, 523]. One splenectomized animal suffered from the disease for nearly a year before dying; a full post-mortem examination was made and the organs were examined histologically. Phagocytosed pigment and parasites were numerous everywhere, but the liver showed the most intense reaction, the Kupffer cells were enormously hypertrophied and distended the sinusoids; foci of central lobular necrosis were common, and the general picture resembled the liver in fatal cases of *P. knowlesi* infections in rhesus monkeys and acute and chronic malaria in children.

The three strains behaved much the same in the cotton rats. In normal animals the infection is benign and may remain occult; in splenectomized animals, its course varies according as to whether the spleen was removed before or after infection—if before, the animals nearly always die in a few weeks or less of a fulminating attack, if after, they suffer from a severe relapse which may prove fatal or may be followed by a chronic infection.

It is clear that the spleen plays an extremely important part in the defence mechanism of the body against infections of *P. berghei*.

P. C. C. Garnham

RODHAIN, J. & VINCKE, I. Essai d'évolution de *Plasmodium berghei*, Vincke et Lips chez *Anopheles maculipennis* (var. *atroparvus*). [**An Attempt to infect** *A. maculipennis* **(var.** *atroparvus***) with** *P. berghei*.] *Ann. Soc. Belge de Méd. Trop.* 1951, Apr. 30, v. 31, No. 2, 297–301, 1 fig.

The natural vector of *Plasmodium berghei* is now definitely known to be *Anopheles dureni* [see this *Bulletin*, 1951, v. 48, 715] ; unfortunately, attempts to breed this mosquito in captivity have failed, so in these experiments a European anopheles was used instead. Strain K 173 of *P. berghei* showed no genuine microgametocytes ; but two strains recently isolated from sporozoites of *A. dureni* showed on occasions numerous exflagellating males. These new strains are called strain III Keyberg 992 and strain IV Keyberg Kisanga. The mosquitoes do not bite mice very avidly, so infected cotton-rats were used in the first experiments. Thirty-nine anopheles engorged fully on these animals, but no infection resulted. In the next experiments the arboreal rat, *Thamnomys surdaster* was employed and 65 mosquitoes were allowed to feed on several of these rodents. The mosquitoes were dissected and in the midguts of two (which had fed on the same animal) oöcysts were found—in one, 3 days after feeding, in the other, either 2 or 3 days after the infective feed. In the first, 3 oöcysts were found—one of which measured 9·6 μ in diameter and possessed very fine pigment lying in curved lines. In the second infection, at least 4 oöcysts were present, measuring from 12·5 to 20 μ in diameter with pigment in curved lines.

[The authors are continuing their researches and it will be interesting to see if they can confirm these observations ; the growth of an oöcyst to attain a diameter of 20 μ in three days or less is quite remarkable.]

P. C. C. Garnham

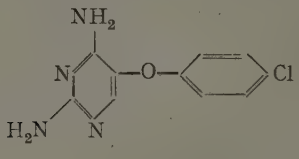
MUDROW-REICHENOW, Lilly. Über die chemotherapeutische Beeinflussbarkeit des *Plasmodium berghei* Vincke und Lips. [**Chemotherapy of** *P. berghei* **Infections.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, Apr., v. 2, No. 4, 471–85. [Numerous refs.]

In order to study the chemotherapeutic effect of different drugs on *P. berghei* infections in mice, animals of 20 gm. weight were inoculated intraperitoneally with 0·3 cc. of heavily infected blood in saline. Drug was given daily by mouth on 5 successive days starting 3 hours after inoculation. Stained blood films were first examined on the last day of treatment, when the blood of most of the control animals had become positive, and on subsequent days, so that the course of the infection could be followed. The number of parasites per microscopic field was roughly recorded. If the blood remained negative as a result of treatment the mouse was reinoculated after 4 to 5 weeks, indicating, if successful, a curative effect. A delay in appearance of parasites for at least 5 days compared with control animals was indicative of drug activity. The method of testing thus resembled that previously described by ROEHL in canaries, the chemotherapeutic indices being recorded in the same way as the quotient of maximal tolerated dose and minimal effect dose, and the activity of different agents was thus compared. A table records the results obtained with *P. berghei* as well as with *P. praecox* and *P. gallinaceum* in the case of well known antimalarials and other substances including aureomycin. It was found that quinine, paludrine [proguanil] and plasmoquine [pamaquin], pentaquine and isopentaquine had little effect on the infection. Atebrin [mepacrine, quinacrine], resochin [chloroquine], sontochin [the methyl derivative of resochin] and camoquin had high therapeutic indices, but not comparable with those of certain sulphonamide drugs which appeared to be

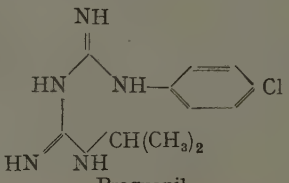
extremely effective. Endochin and thioendochin showed little or no activity, whereas aureomycin was moderately active. In view of these results the value of blood-induced infections of *P. berghei* for screening antimalarials is open to doubt. *J. D. Fulton*

FALCO, E. A., GOODWIN, L. G., HITCHINGS, G. H., ROLLO, I. M. & RUSSELL, P. B. **2 : 4-Diaminopyrimidines—a New Series of Antimalarials.** *Brit. J. Pharmacol. & Chemotherapy.* 1951, June, v. 6, No. 2, 185–200, 2 figs. [22 refs.]

This investigation records the results of tests with a large series (158 in all) of 2–4-diaminopyrimidines substituted in the 5- and 6- positions, against plasmodial infections in laboratory animals. The observation that certain of these substances, like proguanil, are antagonists of pteroylglutamic acid for *Lactobacillus casei*, suggested that they, like the latter substance, might also possess antimalarial properties. Their formal relationships are indicated below.



2-4-diamino-5-*p*-chlorophenoxy-pyrimidine



Proguanil

[As given in the text the Cl atom has been represented by C]

The tests were made on blood-induced infections of *P. gallinaceum* in chicks by the method of DAVEY [this *Bulletin*, 1946, v. 43, 712], in *P. berghei* infections of mice by the method of GOODWIN [*ibid.*, 1950, v. 47, 324], and in *P. cathemerium* infections of canaries. Their activity was compared also with that of known antimalarials. Some tests were also made on sporozoite-induced infections of *P. gallinaceum* and of the monkey parasite *P. cynomolgi*. Oral toxicity tests were carried out on mice with the more active substances and compared with that of established drugs. The results were recorded in 6 categories depending on dosage and effects produced.

Tests were also carried out with selected compounds of the series on other protozoa, without any significant activity being found. In the case of *P. gallinaceum* and *P. berghei* high activity was shown by a number of compounds in blood-induced infections. The order of activity of the substituent group in the 5- position was phenyl > benzyl > phenoxy. Substitution by a halogen or nitro group in the *para* position of the benzene nucleus also enhanced activity. The presence of a substituent in the 6- position of the pyrimidine ring had a similar effect and the compound 2 : 4-diamino-5-*p*-chlorophenyl-6-ethyl-pyrimidine is reported as being 60 times as active as proguanil against *P. gallinaceum* and 200 times as active against *P. berghei*. Two other substances with high activity against these two parasites were less active against *P. cathemerium*. Activity was also shown against the blood forms of *P. cynomolgi*. Some of the compounds showed activity against light sporozoite inoculations of *P. gallinaceum* but little or none against a similar type of infection with *P. cynomolgi*. The large amount of detail included in the paper must be consulted by those interested. *J. D. Fulton*

TAYLOR, D. Jane, GREENBERG, J., JOSEPHSON, E. S. & RAY, A. P. **Studies on *Plasmodium gallinaceum in Vitro*. I. A Method for Maintenance of the Erythrocytic Parasite *in Vitro*.** *J. Infect. Dis.* 1951, Mar.–Apr., v. 88, No. 2, 158–62, 1 fig.

The authors have used a simple method for maintenance of the erythrocytic forms of *P. gallinaceum* in cultures over a period of 24 hours in order to study the physiology of the parasites and the effects exercised by drugs. For this purpose heparinized or citrated blood was obtained by cardiac puncture from normal chickens and 4·4 ml. of this material were then placed in a rocker-dilution apparatus similar to that described by GEIMAN *et al.* (*J. Exper. Med.*, 1946, v. 84, 583) along with 0·5 ml. infected blood containing the desired number of parasites and 0·1 ml. penicillin G solution containing 5,000 units of the drug. The survival rate in culture was quantitatively assayed after different periods by inoculation of young chicks and comparison of the length of the resulting prepatent period with that following inoculation with known numbers of parasites. The results were compared with the survival rate indicated by examination of stained smears. The rocking motion of the apparatus was shown to be necessary for survival of parasites over the 24-hour period. Plasma or serum could not replace whole blood, but washed chick red cells or extracts of them proved as efficient as whole blood. The addition of various substrates failed to increase the survival time of the parasites. The survival rate varied from 50 to 100 per cent. after 24 hours' incubation and was almost zero after 48 hours. It appeared from stained preparations that under the conditions employed segmentation failed to occur. *J. D. Fulton*

GREENBERG, J., TAYLOR, D. Jane & JOSEPHSON, E. S. **Studies on *Plasmodium gallinaceum in Vitro*. II. Effects of some 8-Aminoquinolines against the Erythrocytic Parasites.** *J. Infect. Dis.* 1951, Mar.–Apr., v. 88, No. 2, 163–7. [16 refs.]

In the preceding abstract a method was described for maintaining the erythrocytic forms of *P. gallinaceum* in culture over a 24-hour period. The effect of 6-hydroxy- and 6-methoxy-8-aminoquinolines and related substances on these forms *in vitro* have been compared. The conditions described above were used except that 0·5 ml. of the normal blood was replaced by the same volume of drug adjusted to *p*H 6 to *p*H 8, so that the initial concentration was 5 mgm. per litre of medium. If activity was observed at this concentration, two-fold dilutions of the drug were made till no significant activity resulted. Suitable controls in absence of drug were used in each experiment, and the number of viable parasites present in each control was estimated, as previously described, at the start and at the end of the 24-hour incubation period. The survival rate in the presence of drugs was similarly estimated at the end of 24 hours. The minimum effective dose of a substance was regarded as that which prevented 90 per cent. of the parasites originally present from reproducing when inoculated to a chicken host, as indicated by the lengthened prepatent period. The minimum effective dose of most compounds tested was also determined *in vivo*.

It was found that activity *in vivo* was not correlated with that *in vitro*. Thus the 6-methoxy-8-aminoquinolines pamaquin and pentaquine, which are very active in the chicken, were inactive *in vitro* against *P. gallinaceum* and this suggests that these two drugs exercise their effect through the formation of some metabolic intermediates, several of which have been described [this *Bulletin*, 1950, v. 47, 965 ; 1951, v. 48, 14]. On the other hand, 6-hydroxy-8-aminoquinolines and at least one 5-6-dihydroxy derivative have been shown to possess considerable activity against *P. gallinaceum* in both types of experiment.

The factors which influence this activity are apparently the hydroxy substituents and nature of the side chains in position 8. The effects of modifying the nature of the side chain and the presence of substituents other than the hydroxyl group are discussed. *J. D. Fulton*

GROMAN, N. B. **Dynamic Aspects of the Nitrogen Metabolism of** *Plasmodium gallinaceum in Vivo* **and** *in Vitro*. *J. Infect. Dis.* 1951, Mar.–Apr., v. 88, No. 2, 126–50, 2 figs. [36 refs.]

A considerable number of investigations on the metabolism of malaria parasites, in all its aspects, have been carried out during the last decade in Britain and America. The most complete review of the subject to date is that of MOULDER (*Ann. Rev. Microbiol.*, 1948, v. 2, 101). The rapid growth of the parasite during the developmental cycle indicates the importance of nitrogen metabolism and has been considered by the present author. The problem has been approached by examining *in vivo* and *in vitro* the changes which take place in certain nitrogenous constituents of the chicken erythrocyte during the cycle of development of *P. gallinaceum* and the relationship of these changes to oxidative processes. The techniques used for obtaining and counting parasitized red cells were those of SPECK *et al.* [this *Bulletin*, 1946, v. 43, 1116]. The estimation of the different nitrogenous fractions including ammonia, non-protein, amino and total nitrogen was made on tungstate filtrates, the final step in each determination being conversion to ammonia and colorimetric estimation by means of Nessler's reagent. The determination of soluble and insoluble blood pigments was based on the method of MORRISON and ANDERSON (*Pub. Health Rep.*, 1942, v. 57, 161). The effect of different substrates and respiratory inhibitors on the composition of the various nitrogen fractions was studied with the aid of conventional respirometers. *In vitro* washed infected cells as well as sterile whole blood from chickens were used. The changes noted in the fractions named were first determined on infected chicken cells at 18- to 24-hour intervals early in the infection and at shorter intervals as the peak of parasitaemia was approached so as to avoid the complication of reticulocyte metabolism.

During infection it was found that significant differences occurred in NPN, α-amino nitrogen and haemoglobin values. The *in vivo* changes were qualitatively similar to those occurring *in vitro*, and the author considers the latter method reliable for studying metabolic processes. The asynchronous nature of the infection made it difficult to assess the rate and extent of Hb destruction. No significant changes were observed in total nitrogen. The appearance of ammonia seemed to be more dependent on experimental conditions than on any other factor. The relationship between oxidative processes and hydrolysis of protein indicated previously by MOULDER and EVANS [this *Bulletin*, 1946, v. 43, 1118] was partly confirmed. A mean destruction of 7 per cent. of total haemoglobin was noted in infections studied. It was shown that *P. gallinaceum* destroys only $\frac{1}{4}$ to $\frac{1}{5}$ as much of this substance as *P. knowlesi*, relatively less being destroyed in multiple infected cells. On the results of changes in the nitrogen fractions the author suggests that there is an exchange of these constituents between the parasitized cells and their environment. It was also found that the metabolic activity of reticulocytes was as great as that of some preparations of parasitized red cells. *J. D. Fulton*

MOK, Frances F. **Transmission of** *Plasmodium relictum* **Grassi & Feletti by** *Anopheles freeborni* **Aitken.** *Science*. 1951, Apr. 27, 485.

Anopheles quadrimaculatus, *A. crucians* and a number of culicine mosquitoes have already been shown to be capable of serving as hosts to *Plasmodium*

relictum [this *Bulletin*, 1951, v. 48, 336] and now the findings described in this paper provide further evidence of the ability of anopheline mosquitoes to transmit avian plasmodia.

The original sources of the *P. relictum* were two house finches caught in Berkeley, California. The infections were transferred to canaries by injection. The mosquitoes were *Anopheles freeborni* with *Culex molestus* as control, all laboratory-bred. Eventually three clean canaries were bitten by sporozoite-bearing *A. freeborni*, two of them becoming infected on the 9th and 10th days respectively, while the third was still uninfected after a period of examination lasting 33 days. Five canaries bitten by infected *Culex molestus* all became infected between the 8th and 10th days. *H. S. Leeson*

HERMAN, C. M. **Blood Parasites from California Ducks and Geese.** *J. Parasitology*. 1951, June, v. 37, No. 3, 280–82. [11 refs.]

"Blood smears were procured from 1,011 geese and ducks of 19 species from various locations in California. Parasites were found in 28 individuals. The parasites observed included *Haemoproteus hermani*, *Leucocytozoon simondi*, microfilaria, *Plasmodium relictum* (=*P. biziurae*), and *Plasmodium* sp. with elongate gametocytes. This is the first report of a natural infection with a *Plasmodium* in North American wild ducks."

MANWELL, R. D. **Leucocytozoa and other Blood Parasites of the Purple Grackle, *Quiscalus quiscala quiscala*.** *J. Parasitology*. 1951, June, v. 37, No. 3, 301–6, 6 figs. on pl. [14 refs.]

"*Haemoproteus* and *Leucocytozoon* have been found to be the most common blood parasites of the purple grackle (*Quiscalus quiscala quiscala*). A few cases of *Plasmodium relictum* and *P. cathemerium* were also demonstrated.

"Organ smears of certain of the birds with the heaviest infections of *Leucocytozoon* revealed great numbers of gametocytes in the kidneys, and associated with them, many schizonts of various degrees of development. No similar reproductive forms, nor any such concentrations of gametocytes, were seen in any other organ. The schizonts bore a strong resemblance to corresponding stages in the asexual cycle of *Haemoproteus* and *Plasmodium*, but they are believed to be the multiplicative forms of *Leucocytozoon*. It is suggested that descriptions of species of *Leucocytozoon* should include information about the tissue or organ in which multiplication in the vertebrate host takes place and when possible, of course, the species of vector. Specific determination based chiefly on a supposed host-specificity, or even upon the morphology of the gametocytes, cannot be considered enough."

BLACKWATER FEVER

JELLIFFE, D. B. **Blackwater Fever in African Children.** *Brit. Med. J.* 1951, May 19, 1117–19. [14 refs.]

Accounts are given of four cases of haemoglobinuria in Yoruba [Nigeria] children aged 2, 2½, 5 and 6 respectively. Rings of *P. falciparum* were present in three cases at the time of onset of haemoglobinuria; in the fourth case no parasites were observed. The histories of three cases disclosed attacks of fever and "occasional dosage" of quinine; the haemolytic crises followed shortly after the last dose of quinine prior to admission. Examination of the blood

for sickling is mentioned in only one case, in which there was no evidence of its existence. One patient became severely anaemic and jaundiced and died; no autopsy notes are recorded.

The parents of the children were all of an educated type, which the author regards as a possibly significant factor, since attempted (and usually incomplete) prophylaxis against malaria might obtain in this social group. Parts of the author's interesting discussion are quoted: "The incidence of blackwater fever in Europeans in Nigeria has dramatically fallen in the last few decades.... The most probable main explanation of this decline is that regular prophylaxis with antimalarial drugs is now carried out almost automatically by most of the European population.

"In contrast to this it seems not unlikely that blackwater fever may in the near future occur with increasing frequency amongst the educated African population, especially the children. Antimalarial drugs are increasingly easy to obtain, and skilful advertising in the cinema, Press, and shops will certainly make new African converts to malaria chemotherapy. The danger lies in the likelihood that in many cases chemoprophylaxis will not be continuous—either because the desirability of this may not have been appreciated or for financial reasons. If this is so, the African child in a hyperendemic zone will neither be adequately protected from malaria nor be able to build up immunity to it. A similar situation may be produced by the repeated casual treatment of all fevers in African infants with inadequate doses of antimalarial drugs. This may be overstating the case, as the most likely offender—quinine—is being to a certain extent ousted by the synthetic antimalarials mepacrine and proguanil. However, quinine is still sold very widely, and blackwater fever has been described after mepacrine. Blackwater fever after proguanil does not seem to have been recorded. It must be mentioned, however, that proguanil has been in use for only a few years, and then during the period when the importance of the regularity of prophylactic dosage has been very widely accepted and put into practice.

"In the paediatric out-patient department in Ibadan only intelligent educated mothers who can afford it are advised to give their children malarial chemoprophylaxis in the form of proguanil. In addition, it is stressed to them that this must be an uninterrupted process and, indeed, should continue throughout life as otherwise there is a definite danger that the pernicious manifestations of subtertian malaria—that is, cerebral malaria, etc.—may occur in adult life. It is realized that not all authorities would agree with this advice, as they feel that the 'normal' process of repeated infection with subtertian malaria that occurs in almost all African children in a hyperendemic zone is inevitable and not such a serious matter as is usually suggested."

B. G. Maegraith

GUNTHER, C. E. M. **Blackwater Fever apparently precipitated by Proguanil.** *Med. J. Australia.* 1951, May 19, v. 1, No. 20, 728–9.

The author, in Bulolo, Territory of Papua-New Guinea, reports a case of blackwater fever, probably of the mild intermittent type, in a white man of 27. The only abnormal signs were scanty *P. falciparum* in the blood and a dark brown urine with amorphous débris. The patient's general condition was excellent.

He was supposed to be taking 0·1 gm. of proguanil hydrochloride daily, but was in fact very irregular in taking it. Wau, where he lived, is only moderately malarious, but 18 days earlier he had spent some days in Lae, a hyperendemic area. Here he had slept without a net and took no proguanil. He had taken 0·1 gm. four or five times in the week preceding the attack and 0·2 gm. when the rigor started. Two months before, having temporarily run out of proguanil,

he had taken 5 grains of quinine sulphate daily for 2 weeks. He was quite definite that he had taken no quinine or other medication except proguanil, for 6 weeks before the attack.

He was given 0·6 gm. of Camoquin daily for 4 days ; daily examination of blood films for 5 days revealed no parasites. He was also given alkalis and increased fluids. Urine production was excellent, its appearance and the patient's condition improved rapidly from the second day of treatment and in a week he felt perfectly well and returned to his work as a carpenter.

He has been taking chloroquine diphosphate prophylactically since, without recurrence though this is invariable in insufficiently treated cases in 7 to 10 days.

The author has already reported this mild type of blackwater fever in New Guinea [this *Bulletin*, 1937, v. 34, 228]. It would seem that in this case since Camoquin promptly destroyed all circulating parasites, the disease was aborted. This prompt action of Camoquin in blackwater fever is emphasized—with proguanil and mepacrine, parasites usually persist for 4 or even 5 days. A rapidly acting drug can cut short this type of blackwater fever by removing the parasites. The author readily admits that quinine would probably have been equally effective and safe since in this case it was not the precipitating agent.

The case is reported primarily to record the onset of one type of blackwater fever when the only drug [recently] taken was proguanil hydrochloride : if any drug is to be regarded as precipitating the disease, the proguanil " must have been the precipitating agent ".

The author is careful to stress that the drug had been taken irregularly and in quite the wrong way, " so there is no indication here of its value as a prophylactic ".

[There is perhaps no more, if no less, reason for postulating " precipitation " of the attack by the proguanil in this case than in the many other cases in which precipitation of blackwater fever by a particular drug has been postulated. The phenomenon is one in which the " *propter hoc* " argument is notoriously difficult to sustain.] *H. J. O'D. Burke-Gaffney*

Binet, L., Tanret, P. & Bochet, Madeleine. Etude des échanges respiratoires au cours d'une fièvre bilieuse hémoglobinurique avec anurie grave guérie par exsanguino-transfusion et néphropéritoine. [**Study of Respiratory Exchanges during an Attack of Blackwater Fever with Severe Anuria cured by Exsanguino-Transfusion.**] *Bull. Acad. Nat. Méd.* 1951, v. 135, Nos. 9/10, 151–5, 1 chart.

TRYPANOSOMIASIS

Goarnisson, J. **La trypanosomiase humaine. Notions élémentaires et pratiques.** This book was reviewed on p. 844.

Wood, S. F. **Development of California *Trypanosoma cruzi* in the Bat Bedbug.** [Research Notes.] *J. Parasitology*. 1951, June, v. 37, No. 3, 330–31.

Amrein, Y. U. **Effects of Tyrocidine on *Trypanosoma cruzi* Cultures.** *Proc. Soc. Exper. Biol. & Med.* 1951, Apr., v. 76, No. 4, 744–6, 3 figs.

An earlier report by Weinman (*Proc. Soc. Exper. Biol. & Med.*, 1943, v. 54, 38) had indicated that the antibiotic tyrocidine produced changes in *T. cruzi* grown in culture. The present author has investigated the effects of different concentrations of this substance on standard cultures of the organism.

A diphasic medium described by CHANG (*J. Infect. Dis.*, 1947, v. 80, 164) was used and known numbers of *T. cruzi* added to dissolved tyrocidine of the desired strength. In the presence of 100 μgm. or over per ml. of the antibiotic, growth of *T. cruzi* was adversely affected in proportion to its concentration. Exposure of the organisms to 200 μgm. per ml. for a few hours was lethal. Temperatures between 20° and 30°C. did not appreciably influence the results. Morphological changes occurred when the *p*H of the medium dropped to 6 or below, independently of the presence of the antibiotic. *J. D. Fulton*

DE SOLDATI, L. & RABENKO, J. Nuevos casos de forma cardíaca de la tripanosomiasis Americana. [**More Cases of the Cardiac Form of American Trypanosomiasis.**] *Semana Méd.* 1951, June 28, v. 98, No. 26, 1011–15, 4 figs.

The authors give brief details of four patients presenting the cardiac form of Chagas's disease ; one was a man aged 45 years, the other three were women, one aged 34 years and two aged 46 years. All showed a similar train of symptoms so there is no need for individual detail. They gave histories indicative of a chronic myocarditis and all came from zones where the carrier bugs abounded, Córdoba, Santiago del Estero, San Luis and Buenos Aires. All complained of praecordial pain and dyspnoea, the latter, however, being subjective and not objectively noticeable ; the heart in each case showed some enlargement and signs of right intraventricular heart-block, but with no valvular lesions. The diagnosis was confirmed by complement fixation and xenodiagnosis. Two of the patients were treated with Repodral [a trivalent antimony derivative] to a total of 40 cc. and a definite amelioration was observed. Radiographs of the thorax are reproduced and also sphygmographic tracings of each patient, but these are not very clear. *H. Harold Scott*

LANGUILLON, J. Note sur la présence de *Triatoma rubrofasciata* en Guadeloupe et son infection naturelle par *Trypanosoma conorrhini*. [**Presence of *T. rubrofasciata* in Guadeloupe and its Natural Infection by *T. conorrhini*.**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 5/6, 316–17.

JASWANT SINGH, RAMAKRISHNAN, S. P. & DAVID, A. **Trypanosomes and Plasmodial Sporozoites in the Salivary Glands of a Laboratory-Bred *C. fatigans* Weid., 1828.** *Indian J. Malariology.* 1950, June, v. 4, No. 2, 189–92, 1 pl.

Batches of laboratory-reared *Culex fatigans* were regularly infected with *Plasmodium relictum* from wild house sparrows in Delhi. In April 1950 one mosquito from such a batch showed flagellates in its salivary glands, as well as sporozoites (8 μ long) of the malaria parasite. The flagellates were in a trypanosome form of two types, (i) with a slender body measuring 9·8 μ, an undulating membrane, and a free flagellum 5 μ long, and (ii) larger forms (12·9 μ body, plus 7·7 μ flagellum) with no undulating membrane. The kinetoplast was rarely visible in the latter type. The origin of these organisms is discussed : contamination of materials, including that by raisins used in feeding the mosquitoes, was excluded ; it was thought that the infection might have been derived from the sparrow on which the mosquito had been fed, but its blood contained no trypanosomes. *P. C. C. Garnham*

RODHAIN, J. *Trypanosoma leleupi* n. sp., parasite de *Hipposideros caffer* au Katanga. [*T. leleupi*, **n. sp., a Parasite of *Hipposideros caffer* in Katanga.**] *Ann. Parasit. Humaine et Comparée.* 1951, v. 26, No. 3, 133–7, 3 figs. on pl.

FEVERS OF THE TYPHUS GROUP

JADIN, Jean. Les rickettsioses du Congo Belge et du Ruanda-Urundi. [**The Rickettsial Diseases of the Belgian Congo and Ruanda-Urundi.**] [Thesis.] 108 pp., 1 pl. & 5 charts. 1951. Louvain : Éditions Nauwelaerts, 2, Place Cardinal Mercier. [150 Fr. B.]

This little book is a handy compendium dealing with the extensive work carried out in recent years on the rickettsial diseases of the Belgian Congo and neighbouring regions. References are given to 17 papers by the author, mostly in collaboration with P. GIROUD or other workers and to 48 other papers on the subject. Most of the chief findings have been reviewed in this *Bulletin.*

In addition to the universally employed methods of research the author has made use of Giroud's microscopical modification of the rickettsia-agglutination test, Giroud's intradermal hypersensitivity test and the less familiar Giroud-Jadin agglutinin-absorption test by which rickettsiae contained in suspensions of infected arthropods can be identified by their capacity for absorbing the specific agglutinins of homologous antisera kept in contact with the rickettsiae. The micro-agglutination test is described ; it is regarded as being more sensitive as well as more economical in time and material than the naked-eye test commonly used by " Anglo-Saxon " workers.

The chapter on Murine Typhus contains a description of 19 cases which had been diagnosed as " Congolese red fever " ; in each case there was proof of infection by *Rickettsia mooseri* which was isolated in most of the cases by mouse inoculation ; guineapigs, rats and monkeys were also inoculated ; they reacted in a typical manner. A curious feature was that the Weil-Felix reaction with *Proteus OX19* was positive in only 3 of the 13 cases tested, whereas with *P. OXK* it was positive in 6 cases. Among 11 inoculated monkeys 3 reacted with *P. OX19* at 1–100, whereas 7 reacted with *P. OXK* at titres of 1–100 to 1–1,000. Other observers are quoted as having found a large proportion of reactions of the *OXK* type in sera of cases of typhus-group fevers in Central Africa.

Louse-borne typhus was found in epidemic form in Ruanda-Urundi and the Province of Kivu in the Belgian Congo. The disease was originally regarded as murine typhus because of the orchitic reaction produced in inoculated guineapigs, but the late H. PLOTZ found that 13 out of 18 sera sent to him by the author were definitely of the " epidemic " type as shown by the complement-fixation test ; the remaining sera gave ambiguous or negative reactions.

The author was able to confirm this finding by rickettsia-agglutination tests. Among 1,068 Weil-Felix tests carried out by the author in the region the positive reactions with *P. OX19* were 585 ; with *P. OXK* they were 401, and with *P. OX2*, 319. Titres of 1–4,000 or over were found in 64 cases tested with *P. OX19* and in 13 cases tested with *P. OXK.* [It is interesting to note that Weil-Felix tests carried out by Plotz on the 18 sera already mentioned gave the reactions usually found in cases of louse-borne typhus fever, being predominantly of the *P. OX19* type and never of the *P. OXK* type.]

In Ruanda-Urundi in 1946 there were 2,783 cases of typhus with 323 deaths. [Apparently the disease in the Congo is one of places at heights of 1,500 metres ; more information regarding the association with cool climatic conditions would be of interest.]

Boutonneuse fever occurs in the region ; the author caused a severe rickettsial pneumonia in a mouse inoculated intranasally with a suspension of *Haemaphysalis leachi* but failed to maintain the strain by serial culture. A few isolated cases are described in which the clinical features and the rickettsia-agglutination reaction pointed strongly to the diagnosis of the disease.

Q fever is exceedingly common in many places in Ruanda-Urundi where the conditions of life are ideally suited to the maintenance of the disease. The people live in overcrowded conditions in very close association with the cattle, goats and sheep on which they depend for their livelihood. An outbreak is described in which 450 cases with 40 deaths are believed to have occurred among a population of 6,000. Blood samples of six patients taken at random showed clear evidence of infection and *Rickettsia burneti* was isolated from four of them by guineapig inoculation. Another outbreak of the same kind was investigated with similar results. Among the sera of 32 patients, positive reactions with the rickettsia-agglutination test were obtained in 25 cases at titres of 1–160 to 1–20,480. *R. burneti* was isolated from ticks in the area (*Ornithodorus moubata* and *Haemaphysalis leachi*), and from human lice. With the rickettsia-agglutination test the following reactions were obtained among domestic animals in one area at titres of 1–160 and over : cattle, 13 out of 16 ; sheep, 6 out of 10 ; goats, in all the 12 that were tested ; pigs, 5 out of 17 ; dogs, 6 out of 10 ; horses, 5 out of 10.

Oriental [mite-borne] typhus is strongly suspected of occurring in the area ; the evidence consists of the results of a small series of complement-fixation tests with *Rickettsia orientalis* antigen. The persons tested were living in a trading centre of Ruanda in which Q fever was being investigated. Among eight Arabs from Muscat on the Gulf of Aden, four reacted at titres of 1–640 to 1–1,280, and among four Indians from Bombay two reacted at 1–160. It is stated that two Indians who were born in Africa and had never visited India gave definitely positive reactions with the Giroud intradermal-hypersensitivity test with *R. orientalis* antigen [see also this *Bulletin*, 1951, v. 48, 727].

P. LE GAC is stated to be convinced that scrub typhus occurs in Africa and to have found numerous trombiculid mites on the rodents of Oubangui.

The author expresses no dogmatic opinion on the question of the occurrence of the disease but he suggests that the frequency of the *OXK* type of Weil-Felix response may be associated with the prevalence of *R. orientalis* infection. [It may also suggest that the strain of *P. OXK* used in the tests had unusual antigenic properties.] *John W. D. Megaw*

MONTESTRUC, E. A propos du typhus sporadique. [**The Problem of Sporadic Typhus.**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 5/6, 292–6, 3 figs. on 2 pls. [18 refs.]

A puzzling case of sporadic typhus is described ; the patient was a woman of 39 years who had never been away from Martinique, where no case of epidemic typhus had ever been known to occur, and there was no evidence of contact with persons who had suffered from the disease or with clothing that could have been infected. On the other hand murine typhus is known to occur in the island and, in 1946, 18 cases were diagnosed by rickettsia-agglutination tests.

The patient had been engaged in tending cattle and had often crushed ticks with a large knife. Her house was infested with rats. The fever lasted 16 days and the clinical features suggested a fever of the typhus group.

The Weil-Felix (*Proteus OX19*) reaction was positive at a titre which rose to 1–2,000 in early convalescence. The rickettsia-agglutination reaction reached a titre of 1–4,000 with *Rickettsia prowazeki* and of 1–2,000 with *R. mooseri* ; a month after defervescence the rickettsia-agglutination titre was found by Paul Giroud to be 1–5,120 with *R. prowazeki* and 1–1,280 with *R. mooseri*. The author regards the reactions as proving beyond doubt that the case was one of epidemic typhus.

[Some observers do not subscribe to the doctrine of the universal infallibility of the serological tests in the differentiation between louse-borne and flea-borne typhus fevers.] *John W. D. Megaw*

TENDEIRO, João. Estudos sobre o tifo murino na Guiné Portuguesa. [**Studies of Murine Typhus in Portuguese Guinea.**] *Memórias do Centro de Estudos da Guiné Portuguesa.* No. 13. 1950. Bissau. 208 pp., 1 folding coloured plan, 40 half-tone figs., 5 text figs. & 28 graphs.

This book is noteworthy because of its intrinsic merits and also because of having been written by a veterinary scientist whose incursion into the field of medical research is a striking example of the potential value of close collaboration between medical and veterinary workers.

In spite of the language difficulty the book deserves the attention of everyone interested in the problems of flea-borne typhus ; the illustrations, the bibliography with 82 references, and the numerous quotations in French and English from important articles on the subject have a universal appeal. The main part of the text is written in so clear and simple a style that its meaning can easily be grasped with the occasional help of a dictionary by those who have never learned Portuguese.

There is an excellent summary of the history of research into murine typhus, with special reference to tropical Africa where the disease has long been confused with such fevers as dengue, louse-borne typhus and the mysterious " Congolese red fever ".

The special research described by the author consists of the isolation and study of 11 strains of *Rickettsia mooseri* isolated from rats in and near Bissau, a small town with a population of about 11,000, situated in an island of the same name. The strains were studied by passage through guineapigs, white rats, mice and monkeys. An interesting description, well illustrated with drawings and photomicrographs, is given of the morphology of the rickettsiae, especially those found in the monocytes of infected guineapigs in the forms of homogeneous " initial " bodies and of dense masses called " muriform " bodies. These bodies were found so often as to be regarded as of considerable diagnostic value.

Complete cross immunity was found to exist between the strains and a strain of murine rickettsia from Casablanca.

A case of laboratory infection is described ; this is said to be the first ever detected in the colony though the author believes that the disease must occur in endemic form in the area. Among the reasons for failure to recognize human infection is the fact that the public health department has no special laboratory such as is provided for the veterinary services. *John W. D. Megaw*

WORTH, C. B. & RICKARD, E. R. **Evaluation of the Efficiency of Common Cotton Rat Ectoparasites in the Transmission of Murine Typhus.** *Amer. J. Trop. Med.* 1951, May, v. 31, No. 3, 295–8.

The common biting ectoparasites of the cotton rat in Florida were found to be the mite *Liponyssus bacoti* and the flea *Polygenis gwyni*. The former was found to be a relatively inefficient vector of murine typhus and the latter failed to transmit infection by its bite. In similar conditions *Xenopsylla cheopis* was a very effective vector and it has been occasionally found on cotton rats though these have never been found infected with murine typhus in natural conditions.

In preliminary experiments, suspensions of *L. bacoti* mites that had fed for 8 days on recently inoculated cotton rats were infective by intraperitoneal inoculation into cotton rats, but suspensions of the mites that had fed for 11 to 22 days were not infective.

Suspensions of *P. gwyni* that had fed on infected cotton rats did not become infective till the fleas had fed for 15 to 17 days.

In the crucial experiments on transmission by feeding, 535 *L. bacoti* mites were introduced into a cage containing three freshly inoculated rats and were allowed to remain in free communication with them and with three susceptible rats for six weeks, at the end of which one of the three susceptible rats was found to be infected. In a similar experiment in which 188 *P. gwyni* fleas were used no transmission occurred.

In other experiments the same mites and fleas were placed on infected rats, and some of them were collected at intervals and placed on susceptible rats, all of which remained free from infection. *John W. D. Megaw*

WORTH, C. B. & RICKARD, E. R. **Transmission of Murine Typhus in Roof Rats in the Absence of Ectoparasites.** *Amer. J. Trop. Med.* 1951, May, v. 31, No. 3, 301–5. [11 refs.]

The urine of roof-rats (*Rattus rattus*) infected with murine typhus was found to be free from infection. The urine of rats was infected by adding various suspensions of *Rickettsia mooseri*, and it was kept at room temperature ; it ceased to be infective to mice within an hour. In casein solutions the rickettsiae remained infective for three to six hours.

Susceptible rats were exposed to conditions in which they and their food were heavily contaminated with the urine and faeces of infected rats for a period of one month ; no infection occurred.

Each of three starved susceptible *Rattus norvegicus* rats was placed in a cage with a recently infected *Rattus rattus* which in each case was duly killed and partly eaten by the other rat, which became infected.

In another experiment, 25 *R. rattus* were inoculated and placed in a cage with 25 susceptible *R. rattus* ; cannibalism and fighting occurred and after a month 12 of the 19 surviving susceptible rats were found to be infected.

In an experiment in which natural conditions of overcrowding were simulated some of the rats were trapped, inoculated and returned till about a quarter of the total number were inoculated ; six weeks later 50 of the 66 surviving uninoculated rats were found to be infected. All the rats employed were parasite-free.

In a similar experiment in which there was less crowding 5 inoculated and 25 susceptible rats were kept together in a rat-proof building ; six weeks later 18 of the susceptible rats were caught and only one was found to be infected.

The authors think that infection of rats by fighting and cannibalism is not likely to occur often in natural conditions. *John W. D. Megaw*

RICKARD, E. R. **The Survival Time of the Rickettsias of Murine Typhus in Infected Flea Feces.** *Amer. J. Trop. Med.* 1951, May, v. 31, No. 3, 306–10.

Large numbers of fleas (*Xenopsylla cheopis*) were allowed to feed for 18 days on roof-rats freshly inoculated with murine rickettsiae. The fleas were placed in test tubes till defaecation occurred and then were removed. The tubes containing the faeces were kept at room temperature (75° to 95°F.) with a relative humidity of 80 to 100 per cent. The rickettsiae in the faeces remained fully viable for 48 hours but had ceased to be viable after 96 hours.

The author does not regard air humidity as a complete explanation of remarkably short period of viability, which was in striking contrast with the findings of BLANC and BALTAZARD who found that rapidly dried infected faeces kept in sealed tubes at room temperature remained virulent for more than four years. Further study of the problem is considered necessary.

John W. D. Megaw

MOHR, C. O. **Entomological Background of the Distribution of Murine Typhus and Murine Plague in the United States.** *Amer. J. Trop. Med.* 1951, May, v. 31, No. 3, 355–72, 8 figs. [25 refs.]

The author has prepared a documented and illustrated summary of the recorded distribution of *Xenopsylla cheopis* in the U.S.A. The geographical range and the intensity of infestation of rats with this flea depend in general on the factors of warmth and humidity of the atmosphere ; the distribution of murine typhus and murine plague corresponds closely with that of *X. cheopis*.

The northern rat flea *Nosopsyllus fasciatus* has a distribution which is largely complementary to that of *X. cheopis*. The only outbreak of plague known to occur in the presence of *N. fasciatus* and in the absence of *X. cheopis* was in Tacoma, Wash., in 1942.

The author discusses various points demanding attention in connexion with rat-flea surveys. He defines murine plague as plague among domestic rats as opposed to sylvatic or campestral plague which occurs among native wild rodents. *John W. D. Megaw*

BAIRD, R. B. & TONKIN, I. M. **Endemic Typhus in Mengo District, Uganda.** *East African Med. J.* 1951, Apr., v. 28, No. 4, 157–67, 1 fig. & 1 pl. [25 refs.]

The occurrence of endemic [flea-borne] typhus in Uganda was first suspected towards the end of 1947 when it was noticed that a considerable number of sera sent to the Kampala laboratory gave positive reactions with the Weil-Felix test and that the reactions were associated with a fairly constant clinical syndrome. During the next three years reactions at 1–125 or over occurred in 444 cases. The records of 71 patients admitted to the Mulago Hospital in 1949 formed the chief basis of the present studies.

The clinical features, which included the occurrence of a maculopapular rash, were consistent with the diagnosis of flea-borne typhus ; there were no deaths. In 33 cases attempts were made to isolate rickettsiae by inoculation of guineapigs ; these were successful in 4 cases. A scrotal reaction occurred in 2 guineapigs after primary inoculation and in another after inoculation with washings of the tunica vaginalis of a guineapig which had no scrotal reaction after primary inoculation.

The reaction with *Proteus OX19* was positive in all cases at titres of 1–125 to 1–5,000 ; with *P. OX2* the reaction was twice at the same titre as with *P. OX19*, but in no case was it higher. *P. OXK* was never agglutinated at a significant titre.

Complement-fixation tests carried out at the end of the year and in 1950 gave positive responses with *Rickettsia mooseri* and *R. prowazeki*, " the former generally in slightly higher titre ". J. H. S. GEAR examined a number of the sera and considered that the reactions indicated murine typhus.

The cases occurred sporadically and in the absence of louse infestation.

John W. D. Megaw

LE GAC, P. Les pneumococcies, complications les plus fréquentes du typhus des savanes. [**Pneumococcal Infections, the Commonest Complication of " Typhus of the Savannah Country ".**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 5/6, 275–9.

HAYASHI, H. **On the Causative Agent of Tsutsugamushi Disease isolated from Field Voles, *Apodemus speciosus speciosus*, inhabiting the Foot Area of Mt. Fuji in Japan.** *Kitasato Arch. Exper. Med.* 1951, Jan., v. 23, No. 3, 13–19, 2 figs.

The author describes the isolation of two strains of *Rickettsia tsutsugamushi* [*orientalis*] from two out of 40 field voles (*Apodemus speciosus*) caught in

the foot-hills of Mount Fuji in an area in which cases of mite-borne typhus had occurred in 1948 among the American troops of occupation.

This species of vole had never before been found infected. The strains were isolated by inoculation of white mice with suspensions of the spleen and liver of the voles ; in the case of one strain rickettsiae were first detected in smears of peritoneal exudate of the mice of the third passage, in the other strain they were not seen till the seventh passage.

One strain was identified with the Pescadores strain of rickettsiae by cross-immunity tests on white mice and was inoculated into patients suffering from general paralysis in whom it caused attacks corresponding to those produced by the Pescadores strain with the usual high-titre reactions against *Proteus OXK* [this *Bulletin*, 1940, v. 37, 269]. Patients who had been treated by inoculation with the Pescadores strain failed to react with the Fuji strain.

The author did not find *Microtus montebelloi* during his survey of the area though this vole is known to occur in the locality and is the only natural wild-animal host from which rickettsiae have hitherto been isolated in Japan.

John W. D. Megaw

Valli, E. S. La febbre " Q " nella Repubblica di S. Marino. [**Q Fever in the Republic of San Marino.**] *Riv. Italiana d'Igiene.* 1950, Jan.–Feb., v. 10, Nos. 1/2, 22–31, 5 figs. English summary.

In a hamlet with a population of 57 in the small republic of San Marino in Italy 22 persons were attacked by Q fever during the last 10 days of December, 1949. In the hamlet there were 9 cattle, 38 sheep and several pigs in addition to the other usual domestic animals. Four sporadic cases occurred in the hamlet from the end of February till the middle of March, 1950, and there was evidence of the existence of the disease in the neighbourhood, but no satisfactory explanation could be given of the explosive outbreak now described.

John W. D. Megaw

Golem, S. B. Türkiyede Q Fever ; epidemiyoloji ve hayvan Q Fever'i hakkinda kisa bilgi. [**Q Fever in Turkey : its Epidemiology and a Summary Review of Q Fever among Animals.**] *Türk Ijiyen ve Tecrübi Biyoloji Dergisi.* Ankara. 1951, v. 11, No. 1, 1–21, 1 map. [45 refs.] [French version 22–38.]

Q fever has already been found to occur in 20 of the 63 vilayets of Turkey. Among 182 cases investigated, 121 occurred in persons known to have had contact with domestic animals or their products. All the 7 persons employed in preparing a vaccine for pleuropneumonia of goats at the Veterinary Institute of Istanbul gave positive complement-fixation reactions for Q fever at titres ranging from 1–40 to 1–320 though none of them had a history suggesting a previous attack of the disease.

Among 127 human sera sent for syphilitic tests, 14 were found positive for Q fever and among 741 sera from cases of pneumonia, 236 were positive, many of them at titres of 1–40 to 1–320.

Among animals at Ankara the following numbers of positive reactions occurred, most of them were at a titre of 1–8 : cattle, 30 out of 170 ; sheep, 33 out of 213 ; goats, 17 out of 109.

Among " several " lots of ticks from different places in Turkey no infection was detected.

John W. D. Megaw

JADIN, J. & GIROUD, P. La fièvre Q au Ruanda-Urundi. [**Q Fever in Ruanda-Urundi.**] *Ann. Soc. Belge de Méd. Trop.* 1951, Apr. 30, v. 31, No. 2, 159–77. [10 refs.]

The subject matter of this paper has been reviewed in this *Bulletin*, 1951, v. 48, 244, 543, 544, 545. See also JADIN [above, p. 879].

HERZBERG, K. Zur Epidemiologie des Q-Fiebers in Deutschland. (Verbreitung, tierexperimenteller Nachweis und Serodiagnose.) [**The Epidemiology of Q Fever in Germany. The Distribution and the Diagnosis by Animal Experiment and Serological Methods.**] *Deut. Gesundheitswesen.* 1950, Aug. 31, v. 5, No. 35, 1095–100, 2 figs. [11 refs.]

The author discusses the epidemiological features of Q fever as described in the published reports of 8 outbreaks in South-West Germany during the years 1947–1950. Most of these reports have already been reviewed in this *Bulletin*. He deals chiefly with diagnostic methods including the inoculation of experimental animals, the complement-fixation and rickettsia-agglutination tests. The microscopic, slide-agglutination, test has been found specially useful because of economy in the use of the expensive antigen ; it has the further advantage of not remaining positive so long after the attack as does the complement-fixation reaction and therefore is more reliable as an indicator of recent infection. The serological tests are not usually positive before the 3rd or 4th week. Animal-inoculation tests are of practical value in diagnosis in the early stages of attacks in which there is a strong suspicion of the disease ; otherwise they are seldom employed. *John W. D. Megaw*

HERZBERG, K. & URBACH, H. Untersuchungen mit europäischen Q-Fieber-Antigenen. I. Mitteilung. [**A Study of European Q Fever Antigens.**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1951, June 22, v. 108, No. 4, 376–88.

The technical methods employed in this study are described in detail ; they will be of interest to laboratory workers.

The results of complement-fixation tests of sera of patients with various strains of Q fever antigen are described. The antigens employed were the following :—the Henzerling Italian strain and the " Grita " strain of Gr(aeco) Ita(lian) origin, both of which dated from 1944–45 and were found very similar in their antigenic properties ; the other three strains were isolated in 1948–50 from patients in Germany ; they gave very conflicting responses and the reactions were generally at much lower titres than those observed with the two " Mediterranean " strains.

An extreme example is given below of the remarkable variations that occurred in the complement-fixing antigens when tested in comparable conditions. The example also shows that there is no consistent relationship between the complement-fixing and rickettsia-agglutinating antibodies in the sera of patients.

Antigens	Complement Fixation Tests		Rickettsia-Agglutination Tests	
	" Grita "	German (Stettin)	" Grita "	German (Stettin)
Serum K (Stettin) ...	1–320	1–10	1–80	1–320
Serum G (South Baden)	1–80	Negative	1–160	1–160

This and a number of other examples show the capricious nature of the complement-fixation reaction unless standard antigens and technical methods are employed. Even with the same antigen surprising variations in the response occurred ; for example in one case of laboratory infection a reaction of 1–640 occurred in the second week ; in another case of an equally mild type the reaction was constantly negative for 8 weeks and was found positive at 1–10 in the 10th week and at 1–20 in the 12th week. In the case with the high-titre reaction the rickettsia-agglutination test with the same antigen was persistently negative.

Two further papers are in course of preparation ; these will deal with the agglutination tests and animal experiments. *John W. D. Megaw*

COOMBS, R. R. A. & STOKER, M. G. P. **Detection of Q-Fever Antibodies by the Anti-Globulin Sensitisation Test.** *Lancet.* 1951, July 7, 15–17.

This is a highly technical paper written by experts for experts. The authors describe a supersensitive rickettsia-agglutination test by which very small quantities of agglutinating antibodies can be detected. In 7 of 8 sera from Q fever patients the test was more sensitive than the complement-fixation test, which, with the antigens employed, was positive at much higher titres than the ordinary agglutination test.

The summarized description of the test in the authors' words is " suspensions of rickettsiae are incubated with increasing dilutions of the serum. They are then washed by centrifugation and resuspension in fresh saline, and finally tested for adsorbed antibody globulin by the addition of an anti-globulin serum, which agglutinates those organisms which are sensitised ".

The principle on which the test is based was first employed by MORESCHI in 1908 to enhance the agglutination of rabbit red cells sensitized with a goat antibody ; it has recently been applied to various other tests for the detection of bacterial and other antibodies.

The authors claim that the method promises to be specific serologically and that it may be of value in the study of rickettsial immunity but they refrain from stating final conclusions till many more sera have been tested. They also point out that the process is time-consuming and extravagant in antigen, so it cannot be expected to be of help in diagnosis, especially as the standard serological tests do not suffer from lack of sensitiveness.

John W. D. Megaw

KOSTRZEWSKI, J. Epidemiologia goraczki okopowej. [**Epidemiology of Trench Fever.**] *Med. Dośw. i Mikrob.* Warsaw. 1950, v. 2, No. 1, 19–51, 7 charts. [46 refs.] English summary.

DENGUE AND ALLIED FEVERS

JUDSON, W. E. **An Undescribed Idiopathic Fever on the Isthmus of Panama.** *Amer. J. Trop. Med.* 1951, May, v. 31, No. 3, 275–83, 3 figs. [18 refs.]

The author has studied 250 cases of " tropical fever " selected from about 400 cases of undiagnosed fever seen in the Gorgas Hospital of the Panama Canal zone from March 1943 to March 1947. The clinical pattern and negative laboratory findings were regarded as excluding the known " disease entities " and as suggesting a common unknown aetiological agent. There were repeated histories of insect bites. The clinical picture was one of influenza except that inflammation of the respiratory tract was usually absent. The types of fever

were very varied ; the majority of the cases were of 6 days' duration or less ; in a considerable number the fever lasted 4 days and in a few it lasted 15 to 18 days. The temperature curve was of the " dromedary " type in 7 per cent. and a rash was seen in only 4 per cent. of the cases. General lymphadenopathy was not as frequent as in classical dengue.

In most of the cases a definite leucopenia developed during the course of the attack and relative bradycardia was a characteristic feature. None of the patients died and there were no complications, but convalescence was usually prolonged.

In 1912 an epidemic of dengue occurred in which 60 per cent. of the patients had a rash and in most of the cases there was lymphadenopathy.

Since 1924 no cases of dengue have been reported in the area except for an outbreak of " dengue-like fever " described by FAIRCHILD in 1945 in which the fever lasted 5 to 7 days and a rash was always seen. This outbreak occurred between September, 1941 and March, 1942, and in 13 of the 21 cases in which the fever curve was available this was of the saddleback type [see this *Bulletin*, 1946, v. 43, 329]. The present author states that a common, unknown aetiological agent is suggested by the characteristic clinical pattern consisting of " an acute onset with shaking chills, fever of varying severity and duration, usually persisting for six days, prominent grippe-like symptoms such as severe frontal headaches, pains in muscles and joints, nausea and vomiting, and a prolonged period of convalescence ". [These features, except for nausea and vomiting which are shown in the table as occurring in 15 and 12 per cent., respectively, of the cases and so are hardly characteristic, seem to be quite compatible with the diagnosis of endemic dengue which is notoriously variable in its manifestations except that the fever rarely lasts longer than 8 or 9 days. A substantial number of the cases in the present series lasted longer than this period and the author states that when this happened the fever " often continued until the 14th day ". This and other features of the series suggest that fevers of different kinds which eluded diagnosis may have been included, though in the opinion of the reviewer dengue is the most likely diagnosis for most of the cases lasting less than a week. A non-committal diagnosis of a " dengue-like " fever may be preferred by some observers.] *John W. D. Megaw*

RABIES

LÉPINE, P., PAVILANIS, V. & ATANASIU, P. Action de la terramycine sur le virus rabique, la maladie de Newcastle et la variole aviaire. [**Action of Terramycin on the Viruses of Rabies, Newcastle Disease and Fowl Pox.**] *Ann. Inst. Pasteur.* 1951, June, v. 80, No. 6, 666–8.

This study was undertaken because of the conflicting claims published so far on the action of terramycin on rabies virus *in vitro* and *in vivo*.

1. " *In vitro* " *experiment.*—Brain suspension from rabbits infected with fixed rabies virus was diluted to 1 : 50 with a 0·4 per cent. solution of terramycin and immediately injected cerebrally into 100 mice. Another group of 100 mice was similarly injected with virus only to serve as control. The control suspension was adjusted to *p*H 4 to bring it in line with the *p*H of the terramycin-treated suspension. Mortalities were 40 and 45 per cent. respectively. The virucidal action was ascribed to acidity reaction alone because terramycin adjusted to *p*H 5·8 showed no action whatsoever, and the control solution adjusted to *p*H 4, if allowed to stand for 10 minutes prior to inoculation, had completely inactivated the virus.

2. *"In vivo" experiments.*—Three hundred mice were inoculated intracerebrally with rabbit brain infected with fixed rabies virus diluted 1 : 50 : 200 were treated daily with 2 mgm. of terramycin parenterally from the 2nd to the 11th day after inoculation. In the beginning the treated mice died more rapidly than the untreated controls. On the 12th day mortality was exactly 50 per cent. in both groups. By the 20th day survival rate in the treated group was 8·5 per cent. as against 4 per cent. in the controls. [The probability of this difference occurring by chance is less than 5 per cent.] If the virus dose was augmented to give 100 per cent. mortality in the controls, no difference could be observed in the treated group.

In another experiment mice were inoculated intramuscularly with fixed rabies virus and treated partly orally and partly intraperitoneally. Survival time for the treated groups ranged between 8·8 and 11·5 days, while for the controls it was 8 days. In no instance has a treated animal survived completely.

Similar tests in eggs with the Newcastle and the fowl pox viruses gave completely negative results. *C. Klimt*

CHOLERA

MAY, J. M. **Map of the World Distribution of Cholera.** Reprinted from *Geographical Rev.* 1951, v. 41, No. 2, 272–3, 1 coloured folding map.

The publication consists of a series of maps illustrating the distribution and some of the features of cholera at different periods, with relative letterpress.

1. *World distribution.*—This is shown in a series of six small-scale maps covering periods from 1816 to 1923. The maps show the continued incidence of the disease throughout the period in East and South-East Asia and its extensions westward to Europe and to parts of East and North Africa and to limited areas of the Western Hemisphere in the earlier periods. The map for the period 1912 to 1923 shows that the incidence in Europe was then confined to the Eastern part of the Continent and that no cholera then occurred in Africa or in the American continent. The last occurrence in Europe is stated as 1923.

2. *Historical routes of the major pandemics.*—The routes of spread of the pandemics of 1816–1823, 1826–1837, 1842–1862 and 1865–1875 are shown in a global map. [The map brings strongly to mind the control of cholera which has since been obtained by modern knowledge of the disease and the application of preventive and quarantine measures.]

3. *Permanence of cholera, 1923–1950.*—The map covers the region from Japan to Egypt. The proportion of the period during which cholera had been present in each area is indicated by colour and shading. The disease is shown to have been present during more than 90 per cent. of the time in the greater part of India and Pakistan ; and in Burma and part of Indo-China for 65 to 89 per cent. of the period. Lesser incidence of varying degree is shown in other parts of South-East Asia and low incidence in Japan, Korea, the island groups, Afghanistan, Iran, Syria and Egypt. [A full interpretation of this map would require a detailed knowledge of the actual occurrences.]

4. *Outbreaks of cholera, 1923–1950.*—Peak mortality rates for the same areas as are dealt with in the previous map are shown by country, state or province for three separate decades in the period.

5. *Cholera in India.*—The average monthly mortality rates over a period of ten years in different parts of India are illustrated graphically in relation to vapour pressure.

6. *Egyptian cholera epidemic of 1947.*—The spread of the outbreak and the incidence in each area is illustrated in a simple manner.

The sources of information on which the maps are based are stated. [The series of maps give a good impression of the general geographical feature of cholera. There are, of course, certain epidemiological features of the disease which will be difficult to present graphically, but the author has made excellent use of his material for the type of presentation in limited space which has been adopted.] *J. Taylor*

SEN GUPTA, P. N. **Sub-Types of Cholera Vibrios isolated from Cholera Cases, Calcutta.** *Calcutta Med. J.* 1951, Feb., v. 48, No. 2, 65–7.

"415 strains of true Cholera strains have been isolated from 200 cases of Cholera during the period 9-5-50 to 31-7-50 ; 112 of them were found to belong to sub-type 'Inaba', 302 to sub-type 'Ogawa' and one to the Intermediate type 'Hikojima'.

"In 24 cases repeated cultures showed change in sub-types."

WAHBA, A. Les facteurs antigéniques du vibrion cholérique et leur détermination par agglutination microscopique. [**The Antigenic Factors of** *Vibrio cholerae* **and their Determination by Microscopic Agglutination.**] *Ann. Inst. Pasteur.* 1951, June, v. 80, No. 6, 639–43.

In view of the doubts which have been expressed by some workers on the validity of the minor antigenic factors, D to M of the cholera vibrio, which had been described by BURROWS and his collaborators and also by GALLUT [see this *Bulletin*, 1947, v. 44, 422 ; 1949, v. 46, 631], and the suggestion that they might be *rough* and *non-specific* in nature, a re-examination was made of a series of strains from the Egyptian epidemic of 1947 which had been studied in 1948 and had since been maintained in deep stab culture. Any strains found to be inagglutinable with specific antisera, auto-agglutinable, positive with Millon's reagent, or unstable on boiling were discarded. Both macroscopic and microscopic agglutination tests were carried out with monotype specific antisera on living suspensions, which were found to be the most reliable for the purpose. The microscopic method was eventually selected for routine tests.

Certain differences in antigenic structure were noted. The factors D and E which had been absent from a number of strains at the previous examination had now appeared, and the L factor previously reported in some strains was no longer present. While agglutination with A to E antisera was rapid, agglutination with other sera against some of the minor factors was slow. The C factor was found to disappear from cultures kept in the refrigerator and could not be demonstrated in formolized suspensions. No change in antigenic structure was noted after a series of rapid subcultures.

The author considers that the antigenic character of a strain may possibly be affected by the culture medium employed after first isolation and the method of preservation, and that the antigenic formula is not completely stable.

[This paper does not appear to help in clearing up the point at issue, which could best be settled by the examination of freshly isolated strains of *V. cholerae.*] *J. Taylor*

i. COLLIER, H. O. J. & HALL, Iris F. **Studies in the Chemotherapy of Cholera. V. Effects of Oral Administration of Pteridines, Sulphonamides and their Mixtures to Mice.** *Ann. Trop. Med. & Parasit.* 1951, May, v. 45, No. 1, 51–7. [10 refs.]

ii. ——& ——. **Studies in the Chemotherapy of Cholera. VI. Protection by Pteridines of Mice infected with** *Vibrio cholerae*. *Ibid.*, 58–61.

i. This fifth paper of the series [see this *Bulletin*, 1951, v. 48, 254] deals with the effect of oral administration of certain pteridines, sulphaguanidine and their mixtures to mice, in relation to their possible use in treatment or prophylaxis of cholera. The pteridines used were those designated 0/129, 0/120/II and 0/61.

Toxicity.—Acute oral toxicity was determined by intragastric injection of the pteridines 0/129 and 0/120/II and their phosphates in 10 per cent. gum acacia. The acute oral LD50 of 0/129 was found to be 966±89·3 mgm. per kgm. and of the phosphate 692±91·4 mgm. per kgm. The LD50 of 0/120/II could not be determined as the largest dose which it was found practical to administer (5 gm. per kgm.) was tolerated without toxic symptoms. When administered orally to mice in their diet for a period of three weeks at a concentration of 0·8 per cent., 0/129 and 0/120/II were well tolerated. The tolerated level of 0/61 was 0·2 per cent. Growth was depressed during administration but mice rapidly gained weight on return to normal diet.

Vibriostatic activity of the faeces of mice under oral administration was determined in the manner described in preceding papers of the series. No detectable activity was conferred by 0/129 but high activity was shown when combined with sulphaguanidine. The findings were similar with 0/61. On the other hand, 0/120/II conferred high activity ; this was appreciable even when a concentration of 0·2 per cent. was used. A mixture of one part 0/120/II and nine parts sulphaguanidine added to the diet at a level of 4 per cent. produced high activity for a period of five days.

A comparative test with chloramphenicol, which shows high bacteriostatic activity when added to suspensions of normal faeces, showed that activity could not be demonstrated even when diets were used containing 0·75 and 1·0 per cent. of the antibiotic. " Formo-cibazol " was found to be synergic with pteridine 0/120/II.

ii. In relation to the preceding studies on the pteridines, their value was tested for the treatment of mice infected intraperitoneally with *V. cholerae* in mucin suspension. While 0/129 was found effective by oral administration but not when given intraperitoneally, the results with 0/120/II were the opposite. It is inferred that the difference is due to 0/120/II being less readily absorbed from the gut. Intraperitoneal administration of mixtures of 0/120/II and sulphaguanidine were found to be additive in their effect, and mixtures of 0/129 and sulphaguanidine had some therapeutic value. In comparative tests with chloramphenicol " an intraperitoneal dose of 16 mgm. per kgm. given two hours after infection protected for 48 hours 78 per cent. of mice treated, and double the dose protected 100 per cent. of the animals. On a weight basis, therefore, the activity of chloramphenicol in the mouse infection is more than double that of pteridine 0/120/II phosphate ". *J. Taylor*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

ALBORNOZ PLATA, A. & BONILLA NAAR, A. Estudio epidemiológico de la amibiasis con referencia especial a Colombia. [**Epidemiology of Amoebiasis, with special reference to Colombia.**] *Semana Méd.* 1951, June 7, v. 98, No. 23, 892–8, 2 figs. [14 refs.]

The authors present in a table the records of the prevalence of amoebiasis (*E. histolytica* infection) in various parts of America, including the United States and the countries of South America, and in Cuba, Haiti, Porto Rico and Guadeloupe, stating the names of the authors reporting, the district, the numbers examined, the percentage positive and the year of record.

As regards Colombia, in a recent investigation—the results have not yet been published—7·5 per cent. were found positive among 4,051 faecal examinations in a Bogotá laboratory. Previous records were : in 1948, 176 positive among 1,776 examined (9·9 per cent.) and, in 1949, 140 positive among 1,974 (7·09 per cent. [not 7·18 as stated]).

For control, stress is duly laid on the need for discovering symptomless carriers or cyst-passers, and ensuring that all itinerant vendors of food and drink and all employed in preparing or serving food in cafés, hotels, restaurants and the like should have to be in possession of certificates of health after a proper faecal examination.

H. Harold Scott

RADKE, R. A. **Observations on the Cystic Stage of *E. histolytica* in Abscesses of the Human Bowel.** *Proc. Soc. Exper. Biol. & Med.* 1951, Apr., v. 76, No. 4, 831, 1 fig.

While the exact place of formation of *Entamoeba histolytica* cysts in human infections has not been decided, most textbooks suggest that the cystic stage may be formed in the faecal stream rather than in the bowel wall. Reference is made to the finding of WARTHIN [this *Bulletin*, 1922, v. 19, 686] who describes cysts and pre-cysts of *E. histolytica* in amoebic lesions of the testis and epididymis.

The present author studied this question by careful cleansing of the faecal stream overlying amoebic abscesses. The cleansing was achieved by aspiration with a woven catheter and ear, nose and throat suction machine, followed by aspiration with a 1 cc. pipette. In this way, material containing *E. histolytica* cysts was aspirated from abscesses in the bowel wall of 25 patients with intestinal amoebiasis.

Such cysts pipetted from a minute rectal abscess are illustrated in a photomicrograph.

The author states that these findings suggest that *E. histolytica* cysts may be formed in the tissues rather than in the faecal stream.

H. J. O'D. Burke-Gaffney

KASSEL, R. & MELNITSKY, Ida. **Embedding and Staining Ameboid Forms.** *Stain Technology.* 1951, July, v. 26, No. 3, 167–71.

BAUMEL, J. Amibiase intestinale ; étude clinique, rectoscopique, radiologique et thérapeutique. [**Clinical, Rectoscopic, Radiological and Therapeutic Studies of Intestinal Amoebiasis.**] *Maroc Méd.* 1951, Feb., v. 30, No. 309, 77–88, 17 figs.

The author regards an amoebic infection as comparable with a syphilitic infection ; the similarity lies in their chronicity, and in their evolution over a period of years. Consequently he holds the view that amoebiasis should

be treated as is syphilis by courses of treatment repeated over years, even when apparently cured, to avoid the ultimate complications. After detailing the initial clinical manifestations of amoebiasis and its post-primary symptomatology he describes the chronic state ; this he subdivides into (*a*) that with, and (*b*) that without, intercalary exacerbations. While endoscopy and radiology are of value in differentiating various clinical types and lesions of amoebiasis, it is the parasitological examinations alone which reveal the presence of the amoebic infection and establish the diagnosis.

For treatment of the primary attack emetine, given intramuscularly, remains the drug of choice, and arsenicals also may be given with benefit ; conessine is mentioned as an alternative to emetine ; on its value the author is non-committal, though he gives the impression that he does not favour it and refers to its undesirable side-effects. For the treatment of acute exacerbations of post-primary amoebiasis emetine again is used ; but otherwise repeated courses of one of the pentavalent arsenicals by the mouth, with interspersed courses of the di-iodo-oxyquinoline sulphonic acid series and antibiotics and sulphonamides, are advocated at regular intervals for at least four years. The paper is illustrated by 17 figures showing endoscopic and radiological change.

A. R. D. Adams

Scheikevitch, V. Constipation et amibiase intestinale. Symptômes et thérapeutiques. Importance fonctionnelle primordiale du mucus intestinal [**Constipation and Intestinal Amoebiasis. Symptoms and Treatment. Functional Importance of Intestinal Mucus.**] *Maroc Méd.* 1951, Feb., v. 30, No. 309, 93–7.

Amoebic colitis is often characterized by prolonged periods of constipation with short episodes of diarrhoea. The causes of the constipation are discussed In treatment, to begin with, the constipation should be corrected ; the amoebic infection should then be eradicated ; the means advocated to achieve the first of these aims are stated. *A. R. D. Adams*

Rappaport, E. M., Rossien, A. X. & Rosenblum, L. A. **Arthritis due to Intestinal Amebiasis.** *Ann. Intern. Med.* 1951, May, v. 34, No. 5, 1224–31. 3 figs.

Extra-intestinal manifestations of amoebiasis are due (1) to haematogenous spread of the infection, and (2) to toxic symptoms arising from the primary intestinal focus. These bear no direct relationship to the intensity or symptomatology of the intestinal infection ; they may be so prominent as to obscure the latter. A wide variety of symptoms, singly or in combination, have been ascribed to amoebiasis ; among them arthralgia and chronic arthritis have rarely been mentioned. " Functional, organic and even anatomic disorders of the intestine have frequently been cited as causes of chronic arthritis." In four cases, here described in detail, the predominant complaint was a chronic polyarthritis associated with mild gastro-intestinal symptoms. On the eventual disclosure of intestinal *Entamoeba histolytica* infections in each of these cases, specific anti-amoebic treatment rapidly effected a cure both of the arthritis and of the gastro-intestinal troubles. They were therefore regarded as cases of " amoebic arthritis ", with no clinical features to distinguish them from other forms of infectious or rheumatoid arthritis. While amoebic arthritis is probably rare, examination of the stools for *E. histolytica* is indicated in all cases of " rheumatoid " arthritis with concomitant gastro-intestinal disturbances [see also Zinnemann, this *Bulletin*, 1951, v. 48, 736]. *A. R. D. Adams*

GUILLEMAN. Le traitement de l'amibiase intestinale par l'émétine buccale. [**Treatment of Intestinal Amoebiasis with Oral Emetine.**] *Maroc. Méd.* 1951, Feb., v. 30, No. 309, 89–92.

Conessine, in spite of recent enthusiasm for its employment, is badly tolerated by most patients ; emetine, whether one likes it or not, is still the best available of the anti-amoebic drugs. Nevertheless, emetine fails to sterilize an amoebic infection, it would appear, in an increasing proportion of cases lately. This may be due to differences between strains of the parasite, to inadequate dosage of emetine, or to differences in the state of the lesions at the time patients come for treatment.

It was thought that oral dosage with emetine might give greater exposure of parasites to the drug ; enteric-coated tablets containing 0·02 gm. of emetine were accordingly prepared. The immediate result of the administration of these was vomiting ; when the excipient was altered this stopped but the tablets were found to be passed intact in the stools. Further modification of the coating afforded pills which liberated their contents but caused no digestive or intestinal troubles ; a dosage of 0·2 to 0·24 gm. of emetine in these could be given orally each day for several days, after initial parenteral injections of emetine, without any sign of intolerance. Nevertheless a total daily dosage of 0·12 gm. of emetine so given orally for 5 or 6 days, with a cholagogue, gave as good results as a higher dosage ; the dysenteric symptoms rapidly subsided and both cysts and amoebae vanished from the stools under such treatment. Despite the absence of parasites from the stools it was thought desirable to repeat the treatment after an interval of some days, and then to give a further course of the usual assorted amoebicidal drugs (" treatment of consolidation "). Nineteen examples of the success of such measures are cited in some detail [but no details of the parasitological criterion of sterilization are forthcoming].

A. R. D. Adams

RADKE, R. A. **Treatment of Amebiasis with Atabrine combined with Carbarsone.** *Ann. Intern. Med.* 1951, June, v. 34, No. 6, 1432–44. [31 refs.]

The author records the amazing response to " atabrine " [mepacrine] treatment of a case of liver abscess with a broncho-pleural fistula, after 20 injections of emetine had completely failed to influence it. As a result he felt mepacrine to be worthy of investigation as an amoebicide, this particularly in view of his opinions on the excessive toxicity of emetine and its debatable therapeutic efficacy in amoebiasis. He found mepacrine in cultures of *E. histolytica* to inhibit the growth of this organism *in vitro* ; it did this in concentrations which did not affect the concomitant bacterial growths. Cysts, which were observed in the cultures, were not destroyed by prolonged exposure to the drug. Some unsuccessful attempts were then made to obtain cutaneous amoebic lesions in experimental animals for therapeutic trials of mepacrine *in vivo*.

Twenty-five patients with sigmoidoscopically visible *E. histolytica* lesions were treated orally with mepacrine ; the dosages employed ranged from 0·1 gm. thrice daily for 10 days to 0·1 gm. four times daily for 15 days. The visible lesion vanished in every case, but in one " cysts of *E. histolytica* " were seen in the " sigmoidoscopic specimen " after the shorter treatment.

In view of this, and of the *in vitro* experiments, it was considered that mepacrine was ineffective in destroying the cysts on all occasions. As carbarsone was regarded as effective in doing so, carbarsone treatment was subsequently given concurrently with mepacrine for a 10-day period. Relapses after such treatment occurred in 12 per cent. of those treated [as far as can be determined from the text these totalled less than three dozen] ; this relapse rate compares

very favourably with figures for relapse quoted as representative of the efficacy of other treatments.

The author expresses the view that the lower rate of incidence of *E. histolytica* infections which he cites as occurring in American troops who served in the Pacific area of operations, as compared with the European area, can be ascribed to the widespread use of mepacrine as an antimalarial in the former.

[Certain statements in this paper are open to obvious criticism ; in the reviewer's opinion the conclusions reached are not justified by the evidence adduced.] [See also this *Bulletin*, 1951, v. 48, 808.] *A. R. D. Adams*

GAEHLINGER. Les cures thermales des amibiens. [**Thermal Treatment of Patients with Amoebiasis.**] *Rev. Paludisme et Med. Trop.* 1951, June 15, v. 9, No. 85, 167–75.

No mineral water destroys intestinal parasites. Amoebiasis is not of itself an indication for Vichy treatment ; but this may benefit the associated hepatic and other symptoms, and so be helpful to specific treatment.

A. R. D. Adams

HAWORTH, R. D., MCKENNA, J., POWELL, R. G. & WOODWARD, P. **The Constitution of Conessine. Part III.** *J. Chem. Soc.* 1951, July, 1736–40.

CHANG, Yao-teh. **Yatanoside, a Crystalline Bitter Principle of Ya-Tan-Tzu, Kosam or *Brucea sumatrana*. A Review of Literature, with a Note on its Action *in Vitro* and in Naturally Infected Monkeys.** *Chinese Med. J.* Peking. 1951, Mar.–Apr., v. 69, Nos. 3/4, 87–106. [55 refs.]

The seeds of *Brucea sumatrana* known also as Ya-tan-tzu, Kosam and by other names, have been used in the treatment of dysentery for some hundreds of years. A pharmaceutical preparation has been described but the best results seem to have been obtained with whole seeds, which are relatively non-toxic. The author gives a survey of the literature on the use of this remedy in amoebiasis. It appears that the symptoms of the acute disease are rapidly controlled but the infection generally persists after treatment. The chemical composition of the seeds has frequently been described but they do not appear to contain an alkaloidal principle. A colourless, crystalline glucoside, named Yatanoside, has been isolated from the kernel. The pharmacological and toxic characters of the whole seeds and of Yatanoside have been described. When large doses of the extract of seeds are given to animals parenterally, visceral congestion results, but oral dosage causes only mild symptoms. Yatanoside shows toxic properties similar to those of the whole seeds. *In vitro* it shows about ½ the amoebacidal power of emetine. When tested in monkeys naturally infected with *E. histolytica* in doses ranging from 12 to 30 mgm. per kilo, given subcutaneously, the number of amoebae were temporarily reduced but no cures were effected. [See this *Bulletin*, 1937, v. 34, 955 ; 1941, v. 38, 593 ; 1942, v. 39, 318 ; 1945, v. 42, 39, 733.] *J. D. Fulton*

HRENOFF, A. K. **Treatment of Monkey Amebiasis with Terramycin.** [Research Notes.] *J. Parasitology*. 1951, June, v. 37, No. 3, 329–30.

The author used terramycin in the treatment of 9 monkeys (*Macacus rhesus* or *M. philippinensis*) naturally infected with *E. histolytica*.

Elaborate precautions were taken to segregate the animals and to prevent re-infection : special diets were prescribed. Stools were examined for parasites every 2 weeks for 5 consecutive days.

The monkeys received orally 50 to 200 mgm. of terramycin hydrochloride per kgm. body weight, daily for 8 to 10 days. Total doses were from 1·75 to 8·2 gm.

The results are shown in a table, which indicates that the stools of 6 monkeys were free from *E. histolytica* at the end of 12 weeks. In the other three, the parasite recurred in 5, 9 and 11 weeks respectively.

Within 48 hours of administration of the drug the stools became formed and bulky, the animals improved in health and "several gained weight".

Laboratory examination did not indicate kidney or liver damage and there were no significant changes in blood counts or electrocardiograms.

H. J. O'D. Burke-Gaffney

BEUKEMA, W. (Pseudo-?) leverabsces en colontumor door lambliae. [**Pseudo-liver-abscess and Tumour of Colon attributed to** *Giardia*.] *Nederl. Tijdschr. v. Geneesk.* 1951, May 26, v. 95 (ii), No. 21, 1568–71. English summary.

The patient was a man aged 47 who had travelled much in the tropics in his youth; he complained of abdominal pains and constipation. There was found to be an obstruction of the ascending colon and at laparotomy a tumour was resected and iliotransversostomy was carried out. The tumour consisted of non-specific granulation tissue with much connective tissue. The patient remained well for 3 months, when he developed pain in the right shoulder and right epigastrium with fever, malaise and anorexia; he was re-admitted with a diagnosis of liver abscess. Examination of the faeces showed cysts and vegetative forms of *Giardia*, but it was not possible to demonstrate *Entamoeba histolytica* even by concentration methods. Superficial ulceration of the rectal mucosa was found on proctoscopy and *Giardia* was found in scrapings. Emetine was given in a dose of 30 mgm. subcutaneously, followed by 60 mgm. daily for 4 days. The abscess then perforated through the diaphragm, and infiltration of the right lung and pleural effusion developed. Some sputum was produced but it contained no organisms and the pleural fluid was also sterile and contained no *Giardia* or amoebae. Treatment with penicillin and sulphadiazine was given for a week, as the diagnosis was still uncertain, but there was no response and the patient was by now seriously ill. A diagnosis of giardiasis was therefore considered, and 3 doses of 100 mgm. of atebrin [mepacrine] were given; on the next day the patient was afebrile. The condition relapsed in the next few days but progressed to complete recovery when a second course of atebrin was given. The patient was well when seen 3 months later. It is possible that the inflammatory mass in the ascending colon was a result of *Giardia* infection, and this diagnosis might be considered in obscure abdominal conditions.

D. J. Bauer

RELAPSING FEVER AND OTHER SPIROCHAETOSES

WALTON, G. A. *Ornithodorus savignyi* (**Audouin**) **1826, Argasidae, in the Embu District of Kenya Colony.** *East African Med. J.* 1951, Apr., v. 28, No. 4, 189.

Argasid ticks brought by a game scout appeared to be *Ornithodorus savignyi* and the author therefore visited untracked bush about 18 miles from Embu town in Kenya. Beneath a group of larger trees many ticks were found, but only after the soil was deliberately disturbed. The ticks when released ran about rapidly and climbed the legs of the observers. Examination confirmed that they were *O. savignyi*.

The site is much frequented by rhinoceros, lion, buffalo and other game. The ticks evidently wait in the earth until an animal rests under the trees and then swarm out, feed and return to hiding. The local Africans are either unaware of the presence of these ticks or confuse them with *O. moubata*. Only a few observant hunters and others know where to find them.

It is stated that this appears to be the first record of this species south of Buna and Dela in the Northern Frontier Province of Kenya. It may thus be distributed more widely than has been believed. *H. J. O'D. Burke-Gaffney*

GUGGENHEIM, K., BUECHLER-CZACZKES, E. & HALEVY, S. **The Effect of Protein Deficiency on the Resistance of Rats to Infection with Spirochetes of Relapsing Fever.** *J. Infect. Dis.* 1951, Mar.–Apr., v. 88, No. 2, 105–8. [10 refs.]

The authors tested the susceptibility of three groups of young rats, each comprising 24 individuals, to infection with relapsing fever spirochaetes. The first group was fed on a full diet given *ad lib.*; the second a protein deficient diet *ad lib.*; and the third a full diet restricted in amount to the level of protein intake in the second group. After two weeks on these diets the rats were inoculated intraperitoneally with a Palestinian strain of *Spirochaeta persica* and observed for three weeks. The incubation period was not significantly affected but the periods during which spirochaetes were present in the circulating blood increased from an average of 1·9 days in the first group to 3·7 days in the second, and 2·3 days in the third. None of the infected rats in the first group died of the infection but there was a high fatality in the group fed on a protein deficient diet, 20 dying out of 24, whereas in the uninfected control group only 2 out of 12 died. The fatality in the third group after infection was 2 out of 24 rats.

It is evident, therefore, that protein deficiency increases the susceptibility of rats to *S. persica* as is also the case with other types of infection.

E. Hindle

YAWS

i. KIVITS, M. & FRIEDHEIM, E. A. H. Le traitement du pian par voie buccale au S.T.B. et au Stovarsol. [**The Oral Treatment of Yaws with STB and Stovarsol.**] *Ann. Soc. Belge de Méd. Trop.* 1951, Feb. 28, v. 31, No. 1, 37–49.

ii. KIVITS, M. Le traitement du pian par la Procaïne-Pénicilline huileuse avec Stéarate aluminique. [**Treatment of Yaws with Procaine Penicillin in Oil with Aluminium Monostearate.**] *Ann. Soc. Belge de Méd. Trop.* 1951, Feb. 28, v. 31, No. 1, 51–7.

The first, and probably the second, of these papers records work in the Mayumbe area of the Belgian Congo. There yaws is only exceeded in numerical importance by worm infestations and malaria.

i. In the first year (1931) of FORÉAMI's activity in the area, yaws was found in 12·47 per cent. of the population. In 1934, following routine treatment with a course of 3 injections of bismuth suspension and 5 weekly injections of neoarsphenamine, the case incidence was about halved. From 1936, after the departure of FORÉAMI, routine treatment consisted of 8 injections of 10 per cent. dermatol [bismuth subgallate] at intervals of two weeks. In 1948, the incidence of yaws in Mayumbe had returned to 12 per cent. of the population. The authors wonder why a disease apparently so easily treated as yaws had been so persistent and suggests that insufficient treatment played a part, since

in 1948 two out of three cases treated for yaws had previously received treatment. They consider that the treatment in the last period took too long to make the patient non-infectious, namely 2–4 weeks, and that since all patients in any one village were not treated at the same time, the reservoir of infection persisted.

They think that in mass treatment of an infectious disease where the patient is the only source of infection the incubation period of the disease should be considered in determining the frequency of periodic treatment and that the drug used should rapidly render the patient non-infectious, should be relatively non-toxic and cheap and simple to administer. Bismuth is too slow in action, is not free from toxicity and is frequently followed by relapses. Neoarsphenamine is rapidly active, but intravenous administration makes it impracticable for children. The authors think that STB, a new trivalent arsenical synthesized by FRIEDHEIM [4-oxy-3-acetylaminophenyl arsenoxide, a derivative of acetarsol ; this *Bulletin*, 1949, v. 46, 839] and stovarsol [acetarsol] are very suitable drugs. They then compare the results of treatment with each in primary and secondary yaws.

The course of STB was 5–6 daily doses by mouth, each consisting of 20 mgm. per kgm. body weight. Toxic manifestations were observed doubtfully in only one of 344 patients. Twenty-four to 48 hours after the first dose the lesions not secondarily infected were drying and scabbed and epithelization was complete on the third to fifth day. By the seventh day the scabs were shed and the lesions healed. By the second week the site of the lesions had merged with the surrounding skin. The essential point was that in 1–3 days the lesions were non-infectious.

The course of stovarsol was six daily doses by mouth, each of 20–50 mgm. per kgm. body weight. Lesions were dry in 4–5 days and epithelized in 8 days. Five of 178 cases were at first resistant to treatment. No toxicity was observed.

It was found that previous anti-yaws treatment with bismuth did not reduce the efficacy of treatment with either STB or stovarsol, but that after these drugs patients who had previously received treatment suffered fewer relapses with the passage of time. [Such cases probably were older infections and thus, independently of the later oral arsenicals, might well have suffered fewer relapses.] Over three times as much arsenic per kgm. body weight was received by the patients given stovarsol (81 mgm.) than by those given STB (25 mgm.).

The following table summarizes the essential findings of 18 months' observations on patients who had received previous treatment, together with those who had not.

Duration of observations after treatment in months	Drug used	Cases	Per cent. relapses	Per cent. clinical cures	Serologically negative per cent. of clinical cures
6	STB	202	8·5	91·5	51 of 123
	Stovarsol	128	24	75	72 of 76
12	STB	67	28	72	66 of 39
	Stovarsol	48	25	75	71 of 32
18	STB	59	25·5	74·5	58 of 38
	Stovarsol	*nil*			

The authors regard STB as the drug of choice in mass treatment because it renders the patient more rapidly non-infectious and because it is followed by fewer relapses in the first six months.

[No reference is made to cost of these drugs or to the need for medical supervision to prevent pilfering and over-dosing of potent drugs given by mouth in mass treatment (BOTREAU-ROUSSEL, 1938. *Clinique chirurgicale des pays chauds*, 271, Paris, Masson et Cie). The serological tests employed are not named.]

ii. Procaine-penicillin G in oil with 2 per cent. aluminium monostearate containing 300,000 units per ml. was used. The patients had primary or secondary yaws.

Seven patients were given 1 ml. at monthly intervals for 4 months. After 3–4 days, the lesions were dry, at the end of a week the scabs were shed, after 2 weeks the scars were flat and had disappeared after 5–6 weeks. After 6 months one patient had had another attack of yaws, but after 12 months none of the others had relapsed. Serological reactions were negative for all patients at the end of the third month, but by the ninth 6 had become positive.

Ten patients were given 4 injections on consecutive or alternate days, 1 ml. for those over 25 kgm. and 0·5 ml. for those weighing less than 25 kgm. The immediate results were as above. None relapsed during 9 months but in half the serological tests were then positive.

Forty-nine patients were given injections daily for 4 days to a total dosage of 100,000 units per kgm. (6 mega units for an adult of 60 kgm.). Immediate results were as noted above. Of the 20 patients who had received previous anti-yaws treatment, 2 relapsed in the first 5 months after treatment, while 3 relapses occurred in the first 6 months among the other 20, making a total of 10 per cent. The Wassermann or Kahn reactions were performed at monthly intervals and after 6 months the sera from 19 of 30 patients (63 per cent.) were negative. Observations were not continued for longer periods.

[No mention is made of the more thorough work of REIN *et al.*, this *Bulletin*, 1949, v. 46, 551.]

The author proposes to try the use both of 5 daily doses by mouth each of 20 mgm. per kgm. of STB and 4 daily intramuscular injections each of 25,000 units per kgm. of penicillin in oil. *C. J. Hackett*

LEPROSY

CHAUSSINAND, R. **La lèpre.**

This book is reviewed on p. 937.

JELLIFFE, D. B. **Toxic Hepatitis caused by Diaminodiphenylsulphone.** *Lancet.* 1951, June 23, 1343–4.

Diaminodiphenylsulphone (D.A.D.P.S.), the " parent sulphone ", has been used extensively in the treatment of leprosy, but certain toxic effects have been reported [see this *Bulletin*, 1949, v. 46, 747] when the drug was given by intravenous injection. LOWE and SMITH [*ibid.*, 1950, v. 47, 474] showed that D.A.D.P.S. could be given successfully by the mouth, and to avoid reactions they advised a dose of 0·1 gm. daily, increasing to 0·2 gm. after 2 weeks and then to 0·3 gm. 2 weeks later. Iron was also given. Later, LOWE [*ibid.*, 1951, v. 48, 374] suggested a dosage of 0·1 gm. on 6 days each week for 6 weeks, then 0·2 gm. daily, or, alternatively, of 0·1 gm. twice each week rising by 0·1 gm. each week to 0·4 gm. twice each week by the fourth week. These doses were effective and the risk of reactions was reduced.

The present author has given D.A.D.P.S. by mouth to 50 patients in Nigeria with tuberculosis of different forms. The initial dose was 0·1 gm. daily, increased to 0·2 gm. after one week and to 0·3 gm. after the second week. Three of the patients showed severe toxic reactions after 5–6 weeks of this treatment. All were undernourished on admission, and all showed jaundice, fever, and a generalized morbilliform rash. Liver biopsy showed evidence of extensive damage, but when the drug was stopped the patients gradually recovered.

The author states that these patients were in poor condition, and were therefore far from being ideal subjects ; nevertheless, he advises reduction in the dosage. Minor toxic effects were not common, and did not indicate cessation of administration of the drug. Iron was given as a routine.

In this paper the author is not concerned with the therapeutic effect of D.A.D.P.S. on tuberculosis. *Charles Wilcocks*

HELMINTHIASIS

Erhardt, A. Vergleichende Untersuchungen über den Helminthenbefall von Deutschen, Turkestanern und Armeniern auf dem Balkan. [**Comparative Studies of the Incidence of Helminths in Germans, Natives of Turkestan and Armenians in the Balkans.**] *Ztschr. f. Hyg. Zool.* 1951, Jan., v. 39, No. 1, 1–5.

The author studied the incidence of helminths during 1943/4 in the Balkans, in Athens (German soldiers) in Salonika (natives of Turkestan) and in Valona (Armenians). Fricke [this *Bulletin*, 1918, v. 11, 97] examined 500 Macedonian and Bulgarian soldiers, Macedonian Turks and natives of Macedonia, who were ill or wounded in hospital. The present author used a modified Telemann technique.

A table states his results. It shows that the percentages of subjects infected with worms were : Germans, 12·4 per cent. of 434 persons, Turkestanians, 41·7 per cent. of 230 persons ; Armenians, 84·3 per cent. of 153 persons. Fricke had found that 52·6 per cent. of his 500 subjects were infected.

The present author found that *Ascaris* and *Trichuris* were the commonest worms. *Ascaris* was found in 2·9 per cent. of the Germans, in 22·2 per cent. of the Turkestanians and in 53·6 per cent. of the Armenians. Fricke found it in 34·6 per cent. of his subjects. The author found *Trichuris* in 10·4 per cent. of Germans, in 25·2 per cent. of Turkestanians and in 64·1 per cent. of Armenians, while Fricke found it in 30 per cent. of his subjects. The other species found by the present author, namely, hookworms, *Enterobius*, *Taenia solium*, *T. saginata* and *Hymenolepis nana* were either absent or very much less common, *i.e.* 0·4 to 5·2 per cent. All subjects examined by the present author were only lightly infected. With the exception of *Hymenolepis* only 1 to 5 worms were present.

The presence of hookworms in one Turkestanian, who came from Turkmen, was exceptional. The infection was light and the eggs were those of *Ancylostoma*. Although a few hookworm carriers have been found in Greece, probably this Turkmenian had acquired the infection at home. Of two Armenians with hookworms, one seemed to have *Ancylostoma*, the other *Necator* eggs, but the author doubts whether the eggs can be differentiated.

Schlieper states that *Necator americanus* has been imported into Armenia. Also 3·9 per cent. (6 subjects) of the Armenians had eggs, possibly dead ones, of

Dicrocoelium dendriticum, evidently acquired from the livers of sheep that they had eaten, although Schlieper says that Armenian shepherds are attacked by this liver fluke. The author remarks on the close correspondence between his results and those of Schlieper, who examined 18,667 Armenians. Of these he found that 84·7 per cent. were infected with worms, that 59·9 per cent. had *Ascaris*, 73·3 per cent. *Trichuris*, 0·1 per cent. hookworm, 12·2 per cent. species of *Taenia* and 4·1 per cent. [*Hymenolepis*], while 9·9 per cent. had *Trichostrongylus* and 0·1 per cent. *Strongyloides*.

A point of biological interest is the presence of *Hymenolepis nana* in two German soldiers in Greece. The question whether *H. nana* is the same species as *H. fraterna* of rodents or whether these are biological races of the same species has not been decided. Brumpt (*Précis de Parasitologie*, 6th Edn., 1949) pointed out that during the first World War French soldiers, who had never left France, but had lived with rats infected with *Hymenolepis* in trenches there, never became infected with this tapeworm ; but that in the Salonika region, where *Hymenolepis* infection of man is endemic, it was often found in French soldiers. The author suggests that, just as *Entamoeba histolytica* is almost always non-pathogenic in temperate climates and becomes pathogenic in warmer ones if the resistance of the intestinal wall is reduced, so rodent species of *Hymenolepis* might first become established in man when similar factors operate. *H. diminuta* of the rat could not be found in the subjects examined by the author, but it was found in one German soldier in Macedonia.

G. Lapage

Janicki, M., Konopacka, B. & Dymowska, Z. Robaki i pierwotniaki przewodu pokarmowego ludności miasta Warszawy w latach 1940–1943. [**Intestinal Helminths and Protozoa in Children and Adults of Warsaw City during 1940–1943.**] *Med. Dośw. i Mikrob.* Warsaw. 1950, v. 2, Nos. 3/4, 586–98, 3 charts. [27 refs.]

The English summary appended to the paper is as follows :—

"Examinations on helminths involving 11,217 persons of different age and occupation were performed in Warsaw during the period 1940–44.

"26·7% of examined persons proved to be infected by parasites. Trichuris trichiura was the most frequently found parasite in adults and in children 20% Oxyuris vermicularis was present in 18% of cases. Lamblia intestinalis was most frequently found particularly in faeces of 1–5 years old children."

Hitchcock, Dorothy J. **Parasitological Study on the Eskimos in the Kotzebue Area of Alaska.** *J. Parasitology*. 1951, June, v. 37, No. 3, 309–11.

"1. Examination of six fecal samples from each of 100 Eskimos failed to reveal *Endamoeba histolytica*. The incidence of the non-pathogenic intestinal protozoa was about the same as in the Bethel study.

"2. *Diphyllobothrium* sp. was found in 6% of the group examined. In the Bethel group the incidence was 15%.

"3. *Enterobius vermicularis* was found in 43% of the people examined, occurring about equally in children and adults.

"4. Of the 300 Eskimos skin tested for trichina 1·6% were positive reactors, and 3·2% of the 366 Eskimos skin tested for hydatid disease were positive reactors." [See also this *Bulletin*, 1950, v. 47, 862.]

González Castro, J. Propagacion de algunas helmintiasis intestinales, por el papel moneda. [**Dissemination of some Intestinal Helminths by Paper Money.**] *Rev. Ibérica de Parasitologia.* 1951, Jan., v. 11, No. 1, 3–9.

The English summary appended to the paper is as follows :—

" The presence of Ascaris eggs (immature and mature) and mature eggs of Oxyuris on one and five pesetas banknotes is demonstrated. This paper money must be added to the many methods by which man can become infected with these helminthiases in Spain, producing during summer, less probably in winter, light helminthian infestations, which by reiteration could become intense." [See also this *Bulletin*, 1949, v. 46, 761.]

Standen, O. D. **Some Observations upon the Maintenance of *Australorbis glabratus* in the Laboratory.** *Ann. Trop. Med. & Parasit.* 1951, May, v. 45, No. 1, 80–83, 1 pl.

Research on schistosomiasis in non-endemic areas is to a considerable extent dependent on the maintenance of adequate stocks of suitable snail vectors, from which laboratory animals can be infected. In this connexion *Australorbis glabratus* has proved particularly suitable for the maintenance of *S. mansoni* infections for it lives well under laboratory conditions, is easily infected and subsequently produces large numbers of infective cercariae. On the other hand, the provision of adequate numbers of these snails at the particular age period most suitable for infection presents certain difficulties. These difficulties and the various ways by which they may be overcome are described in the present paper. The author recommends that in order to provide egg-traps and to encourage egg-laying, *Ludwigia palustris* should be planted in the aquarium. Under laboratory conditions the young snails which have hatched from the eggs obtain their principal food supply from algal growths in the aquaria, but when these become exhausted the snails cease to thrive. This difficulty has been surmounted by using an artificial food in a calcium alginate gel which is suspended on the surface of the water and on which the young snails feed voraciously. [The reviewer has tried out the technique recommended by Mr. Standen and can testify to its efficacy.]

R. M. Gordon

Lurie, H. I. & de Meillon, B. **Skin Tests for Schistosomiasis.** *South African Med. J.* 1951, May 12, v. 25, No. 19, 321–4. [19 refs.]

It has long been realized that a search for ova is unduly laborious in large-scale investigations into the incidence of bilharziasis. Fairley [this *Bulletin*, 1920, v. 15, 217] first elaborated a complement deviation test ; this proved to be group-specific for schistosomal infections, but not species-specific. Further elaboration of tests of this type with varied antigens proved it to be diagnostically unreliable. Fairley and Williams [this *Bulletin*, 1928, v. 25, 458] first devised a skin test with an antigen prepared from the livers of snails infected with *Schistosoma spindale* ; this, though giving positive readings in proven cases of infection, also gave some false positives in the uninfected. The obvious advantage of simplicity in performance of a skin test led others to endeavour to develop antigens which would give reliably consistent results ; the literature on the subject is here summarized. From a study of it there emerge the conclusions that reports on false positive reactions are conflicting, and that a single antigenic factor is common to antigens prepared from any of several flukes. The authors consider that false positive reactions given by an antigen would be relatively unimportant in screen testing, but that it is essential that there should be no false negatives, or cases of bilharziasis would be missed.

They first prepared an antigen for intradermal testing for bilharziasis from dried pulverized *Fasciola hepatica* ; this they found to give false negative results in children, though rarely in adults, and moreover it lost its antigenic powers within four years even when kept in a refrigerator. They suggest that the negative results in children might be due to their shorter infections.

Another antigen was then prepared from cercariae shed by infected snails [the genus and species of neither the cercariae nor the snails are stated]. Preliminary tests with this showed it to possess greater specificity than the *F. hepatica* antigen in that it gave no false negative reactions, though two were doubtful, in 28 proven cases of bilharziasis. It did give some false positives. This antigen has retained its potency over three years in an incubator and over 6 months at room temperature. This cercarial antigen for skin testing can be regarded as valuable for screen testing for bilharziasis in endemic areas.

A. R. D. Adams

LAGRANGE, E. L'action oligodynamique sur les planorbes. [**Oligodynamic Action on** *Planorbis*.] *C.R. Soc. Biol.* 1951, Mar., v. 145, Nos. 5/6, 458–9.

The following is a translation of the author's summary :—

Metallic copper exerts an extremely intense toxic action on *Planorbis* snails immersed in its neighbourhood. *H. J. O'D. Burke-Gaffney*

JEWETT, J. S., BURNER, A. M. & HOLT, C. J. **Cysticercosis Cellulosae. Report of a Case.** *Amer. J. Clin. Path.* 1951, June, v. 21, No. 6, 590–92, 4 figs.

" An instance of subcutaneous cysticercosis cellulosae is reported in a veteran of World War II. The presented symptom of convulsions was believed to be the result of cerebral involvement."

ZANDER, R. Über einen Fall von generalisierter Cysticercose. [**A Case of Generalized Cysticercosis.**] *Deut. Gesundheitswesen.* 1951, June 7, v. 6, No. 23, 658–9. [12 refs.]

VARA LÓPEZ, R. & INCLÁN BOLADO, J. L. Quistes hidatidicos de riñon. Comentarios a cuatro casos. [**Four Cases of Renal Hydatid Cysts.**] *Rev. Clín. Española.* 1950, June 15, v. 37, No. 5, 316–24, 8 figs. [51 refs.] English summary (3 lines).

AUBRY, G., BOULARD, C., MASSONAT, J. & ZEVACO. Un cas d'échinococcose hétérotopique du péritoine avec volumineuse vésicule libre. [**A Case of Heterotopic Echinococcosis of the Peritoneum with Large Free Vesicle.**] *Algérie Méd.* 1950, Feb., v. 54, No. 2, 89–91.

CELLERINO, N. A. El procedimiento de Lasnier en el diagnóstico de la hidatidosis. [**Diagnosis of Hydatid by the Lasnier Method.**] *Jornada Med.* Buenos Aires. 1950, Mar., v. 4, No. 34, 93–6, 5 figs.

The Lasnier procedure consists in the finding of fragments of hydatid cuticle after staining by Best's carmine. The only difficulty lies in distinguishing these fragments from other carminophilic elements, such as mucus, fibrin, vegetal residues. The author gives details of the procedure in a case of hydatid of bone. The bony tissue is fixed in 10 per cent. formol and decalcified in 5 per cent. HNO_3 ; the pieces are then suspended for 24 hours in 5 per cent. sulphate of sodium, washed in running water for 24 hours, dehydrated and embedded in paraffin in the usual way.

Best's carmine is prepared by mixing carmine 2 gm. with potassium carbonate 1 gm., potassium chloride 5 gm. and distilled water 60 cc., boiling for " several minutes ", allowing to cool and adding ammonia, 20 cc. This stock solution will keep in the cold for some months. For use, 2 parts of this are mixed with 3 parts of ammonia and 3 parts of methyl alcohol. The original differentiating fluid consisted of ethyl alcohol 80 cc., methyl alcohol 40 cc., distilled water 100 cc., but the proportions of 40, 20 and 40 cc. respectively are preferable. Five photomicrographs show the pathological picture. [See also this *Bulletin*, 1943, v. 40, 614.] *H. Harold Scott*

THIODET, J. Une manifestatión rare de l'allergie echinococcique " osteopathie hypertrophiante pneumique au cours d'une echinococcose pulmonaire ". [**Marie's Disease as an Allergic Manifestation of Pulmonary Hydatid.**] *Archivos Internac. de la Hidatdosis.* Montevideo. 1950, Oct., v. 11, Nos. 1/2, 67–73.

Marie's disease, or pseudohypertrophic pulmonary osteoarthropathy, is usually regarded as the result of chronic disease of the lungs, often but by no means always tuberculous, of empyema or bronchiectasis, or of congenital heart disease. So far as is known—so far at least as the author is aware—it has not been recorded as the result of hydatid of lung. Further, in the present instance the condition is ascribed, not to the results of circulatory obstruction, but to allergy, because when the cyst was dealt with the oedema rapidly disappeared. Later, some suppuration in the lung led to a partial return of the swellings, but the use of phenergan and further surgical intervention [the nature of this is not defined] resulted in renewed improvement. *H. Harold Scott*

BEAVER, P. C. **Hemoglobin Determination in Hookworm Disease Case-Finding.** *Amer. J. Trop. Med.* 1951, Jan., v. 31, No. 1, 90–97. [21 refs.]

The present tendency in hookworm control programmes is to concentrate on infected families rather than on infected individuals and to identify these families by a special form of survey in which those with hookworm disease rather than those with hookworm infection are sought. The study reported was designed to establish standards for anaemia in children of various ages and to test their applicability to a practical hookworm control programme.

Haemoglobin estimations were made in Georgia on 1,174 urban schoolchildren of a good economic status and on 1,307 schoolchildren in a neighbouring rural area where hookworm was endemic. The results were analysed by age-groups and the season in which the examination was made. For children aged 6 to 10 years 10 to 10·5 grammes of haemoglobin per 100 ml., and for children aged 11 or over 11 to 11·5 grammes, were considered border-line. On these criteria about 3 per cent. of the children in the rural area were anaemic and about 7 per cent. were border-line cases.

Anaemia without hookworm infection was observed only in three children ; at the time of the survey good lunches were provided for all the children.

Stool examinations on 544 subjects showed that 297 were infected with hookworms ; of these, 40 were anaemic and 74 border-line cases. Almost all children with egg counts of 20,000 per ml. of faeces or more and half those with counts between 5,000 and 20,000 eggs per ml. were either anaemic or border-line.

" The conclusion is reached that hookworm disease case-finding based on egg-counts restricted to anemic individuals will discover most of the extremely heavy infections. However, it will fail to detect an important group of individuals whose hemoglobin levels, although markedly reduced by hookworm infection, are still within the range of normal." *L. E. Napier*

Biocca, E. **On *Ancylostoma paraduodenale*, a New Species from Felines, closely related to *A. duodenale*.** *J. Helminthology.* 1951, v. 25, Nos. 1/2, 11–18, 14 figs. [19 refs.]

Lommel, F. Zur Askaridenseuche. [**On Ascariasis.**] *Med. Klin.* 1951, June 15, v. 46, No. 24, 685–6.

The author briefly reviews the various forms of disease caused by *Ascaris* and gives figures which indicate the increase of infection with it in Thuringia, an increase paralleled elsewhere in Germany and in Switzerland. The author's collaborator, Pfeffer, thought that the Thuringian infection came from infected soil and found *Ascaris* eggs in 6 out of 24 samples of the garden soil of Thuringian villages. He also found them on carrots and salad plants. These vegetables could be freed from the eggs by careful washing and by rubbing the individual plant leaves. Out of 15 soil samples taken from a meadow next to a school which was used as a playing field, 14 contained eggs of *Ascaris*. The infection of the field was apparently traced to the use of human manure provided by the farmer, all the members of whose family were infected with *Ascaris*. The author discusses ascariasis in the Darmstadt area [already abstracted fully in this *Bulletin*] and in Schleswig-Holstein, where the incidence did not increase in spite of stringent conditions of life. He then discusses the measures that should be taken to control the infection. *G. Lapage*

Gärtner, H. & Müting, Lieselotte. Beitrag zur Frage der Lebensdauer von Ascariden-Eiern im Reiselfeldboden. [**Length of Life of Ascarid Eggs in the Soil of Sewage Fields.**] *Ztschr. f. Hyg. u. Infektionskr.* 1951, v. 132, No. 3, 244–9.

Discussing the length of life of ascarid eggs outside the host, the authors record the evidence suggesting that these eggs do not live much longer than one year. Demoll, quoted by Seiser (*Zent. f. Bakt.* I. Abt. Orig., 1950, v. 155, 299* and 309*) found hardly any eggs in the uppermost layers of Munich soil. Baumhögger (*ibid.*, 308*) concluded that the eggs die in sewage fields and others have reported their destruction in sewage and anaerobic environments.

The authors' studies of sewage fields recently irrigated and other fields that had been flooded for more than 8 months, including one winter, showed that eggs in the latter type of field were less numerous and were much more often damaged and that in all the fields studied the numbers of eggs were, if one ascribed to them a life of 5 years, too small in relation to the egg-content of the sewage.

The authors confirmed their suspicion that the salt-solution technique used did not float up eggs dried on earth particles. When soil samples with the same egg-content were examined by their own, and by Spindler's techniques, the same egg content was found when the samples were kept moist, but, after drying, the egg-counts by Spindler's technique were markedly higher than those given by the authors' technique. A report of this work is in the press.

The authors examined, by both techniques, three fields that had last been irrigated ten months previously. They found that the egg-counts were similar by both methods, but that the eggs were fewest in the upper layers of the soil, where drying operated, and they suggest that the eggs in these layers were killed by the irradiation and warmth of the sun. It is important to avoid the conclusion that any single egg-count is valid throughout the day. A table shows the number of eggs found in samples taken 6 times a day for 9 days, together with the amounts of sedimented matter in the sewage. It shows that the counts were low at 7 a.m., rose to a peak at 11 a.m. and thereafter fell again.

The authors also report observations on a sewage field divided into three parts. These parts were irrigated in the autumn of 1948 with crude sewage effluent. Area 1 then received the crude effluent, area 2 treated effluent and area 3 drain water. It is stated in the literature that mechanically-cleansed effluent contains no ascarid eggs and the authors have established that there were none in the Munster drain water. If therefore the eggs are killed by overwintering on the fields or by decomposition, this would appear in the results. On May 10, June 19, July 4 and August 18 of 1950, the authors examined samples from these three areas by both techniques, especial care being given to areas 2 and 3. In area 1 eggs were found right up to the surface layers, as earlier work suggested that they would be ; in areas 2 and 3 no eggs were found, either in the upper or deeper layers. These areas certainly contained eggs in the winter of 1948/9, because the authors never found a field that had been recently irrigated in which all layers did not contain them. They conclude that the eggs had not survived 1½ years including two winters. Because they had found that the eggs survived 8–10 months, including one winter, although many were then damaged and numbers were reduced, they conclude that the eggs die during the second year.

This conclusion conflicts with the work of SCHÄFER, who found that the eggs survived 3 years in earth ; but there is evidence, some of which is quoted, that sewage fields provide injurious anaerobic environments of the kind needed. *G. Lapage*

JETTMAR, H. M. & EXNER, Hilde. Thermoresistenzversuche an Ascaris- und Trichuris-Eiern. [**Experiments on the Thermal Resistance of the Eggs of *Ascaris* and *Trichuris***.] *Arch. f. Hyg. u. Bakt.* 1951, v. 134, No. 3, 173–86, 4 figs.

After a brief summary of some of the literature, the authors explain that they gave special attention to the effects of thermal factors that operate under natural conditions and studied chiefly the effects of moist heat between 45° and 55°C. Eggs of *Ascaris lumbricoides* and *Trichuris trichiura* were obtained from human faeces ; those of *Ascaris megalocephala* [*equorum*] were obtained from the uteri of worms taken from slaughtered horses. The techniques used should be read in the original. The eggs were put in small tubes about 4 cm. long, each tube receiving about 500–1,000 eggs. The tubes were filled with water and then sunk in fluid, the temperature of which was controlled by thermostats. The tubes were left for fixed periods of time and then were put, with the closed end upwards, into test-tubes full of water. By centrifugation the eggs were thrown out of the open ends of the smaller tubes into the test-tubes and the empty capillary tubes were removed. The test-tubes were then closed with sterile corks and kept at 30°C. to embryonate the eggs, the tubes being opened and shaken periodically to admit oxygen. Under these conditions the eggs of *Ascaris megalocephala* mostly developed motile larvae in 5–10 days, those of *A. lumbricoides* needed 14 days and those of *Trichuris* 20 days. This conflicts with Leuckart's statement that the eggs of *Trichuris* need 6 months to develop larvae. After this treatment, eggs were classified as dead and incapable of development or as developed as far as the one-cell, or two-cell stage and so on, but it was found that most of them were either dead or contained motile larvae. The authors note the striking fact that the thermal resistance of the eggs of the two Ascarid species and those of *Trichuris trichiura* was very similar, although *Trichuris* belongs to a different order of nematodes and the shells of ascaroid and trichurid eggs are very different.

Each experiment with heated eggs was repeated and all were controlled by two or four batches of untreated eggs kept under the same conditions. Graphs illustrate the results obtained.

The effect of dry heat was studied by smearing the eggs of *A. megalocephala* kept in 0·5 per cent. formalin on to glass slides and drying them in 15 minutes at room temperature. The dried eggs were then exposed in the dark to the experimental temperatures. To test the capacity of the eggs to embryonate after these exposures, the slides were put into water in wide corked glass tubes kept at 30°C. The eggs remained on the slides. Drying alone for a week in this way did not kill the eggs, but dry heat killed much more quickly than did moist heat of the same degree.

To test the deleterious effects of repeated freezing and thawing, which occurs naturally in the winter, the authors put some hundreds of the eggs of *Trichuris* and *Ascaris megalocephala* into small tubes each containing 1 cc. of water. These tubes were then frozen and thawed repeatedly and incubated at 30°C. to test the capacity of the eggs to embryonate. The eggs of *A. megalocephala* were incubated for 5–12 days, those of *Trichuris* for 14–20 days. The effects of the sun's rays were tested by exposing the eggs of *A. lumbricoides* to the sun on two days of different sun intensity.

Effects of moist heat.—The highest temperatures used (70°, 80° and 90°C.) killed all the eggs of all the three species tested in 2 seconds. At 65°C. they survived only for a few seconds. At 60°C. about 50 per cent. of the eggs were dead in 10 seconds ; after 20 seconds only individual eggs were still able to develop ; after 25–30 seconds all were dead. At 55°C. the eggs of all 3 species gave different results. Most of the eggs of *A. lumbricoides* and *Trichuris* were killed in 100 and 200 seconds, but more of those of *A. megalocephala* died after 20 and 60 seconds. The authors reject the view that the eggs of the latter species were less resistant because they were taken from the uteri of the worms rather than from the host's intestine and point out that the eggs of *A. megalocephala* were not less resistant to 50°, 60° and 65°C. At 50°C. the resistance of the eggs of *A. lumbricoides* and *Trichuris* was strikingly similar, although their egg-shells are so different. After 50 minutes of moist heat at 50°C. most of the eggs of these two species were able to develop, but after this time death quickly occurred and after 1½ to 2 hours only isolated eggs survived. The eggs of *A. megalocephala* died earlier at this temperature after exposure for 6¾ to 30 minutes.

The lower temperatures tested (46°, 48° and 50°C.) are important because these may prevail under natural conditions, but the effects of them were tested on the eggs of *A. megalocephala* only. At 48°C. many eggs died after 4 hours 10 minutes and all were dead after 7 hours. At 46°C. many were dead after 7 hours and all were dead after 16½ hours. At 45°C. about half the eggs were dead after 7 hours, but about a third of them developed motile larvae after 19 hours. At temperatures below 37°C. injury to the eggs, after a proportionately longer time, was observed ; it appeared first after a few days of exposure. The optimum temperature was 30°C. and temperatures below this materially slowed down development.

Dry Heat.—Only the eggs of *A. megalocephala* were used to test this. At 55°C. all the eggs were dead after 15–20 minutes in one experiment and after 10–16 minutes in another. At 46°C. about half the eggs were dead in 2 hours and all were dead after 8 hours. Thus dry heat killed much more quickly than moist heat did. These experiments were controlled by eggs prepared in the same way and screened from light and exposed to 22°C. All the eggs tolerated this temperature for 72 hours and produced practically the same percentage of embryos motile as did eggs kept moist. It thus seems that it is the high temperature that kills, because drying by itself at room temperature does not

harm the eggs. But, when higher temperatures are used, drying does operate as well as the high temperature.

Repeated freezing and thawing.—To test the effects of this the eggs of *Trichuris* and of *A. megalocephala* were used. Freezing and thawing were repeated once, twice and 5, 10, 20 and 30 times. These experiments showed that after 2 repetitions, only a few eggs of *Trichuris* were damaged, but that after 10 repetitions more than half of them were dead. After repetition 20 and 30 times all the *Trichuris* eggs were dead, but some of those of *A. megalocephala* developed degenerate or damaged larvae and stages preceding the larval stage showed degeneration. After 10 repetitions more than half the eggs of *A. megalocephala* developed larvae, but most of them were degenerate and even those that were motile looked abnormal and were sluggish.

Effects of irradiation by the sun.—On the first day, in June, exposure to the sun for 4 or more hours killed all the ascarid eggs and exposure for 3 hours killed 96 per cent. of them at the single-cell stage and 4 per cent. at the two-cell stage. On a day in August, 55 per cent. of the eggs developed motile larvae after exposure for 8 hours. The difference between the results is attributed to the lower intensity of the sun on the August day and to the fact that the eggs tested in August were in thicker films, and to the different handling after exposure, the eggs tested in June being incubated under coverslips, while those tested in August were kept wet in tubes. *G. Lapage*

Bogaert, W. Quelques considérations au sujet de l'ascaridiose. A propos d'un cas de perforation intestinale par ascaris. [**A Case of Intestinal Perforation by *Ascaris*, with some Observations on Ascariasis.**] *Ann. Soc. Belge de Méd. Trop.* 1951, Apr. 30, v. 31, No. 2, 303–6.

Sivaratnam, C. **Ascariasis, its Treatment and some Unrecorded Clinical Manifestations among Ceylon Children.** *J. Ceylon Branch Brit. Med. Ass.* 1950, Sept., v. 45, No. 3, 36–49.

Sandosham, A. A. **On Two Helminths from the Orang Utan, *Leipertrema rewelli* n.g., n.sp. and *Dirofilaria immitis* (Leidy, 1856).** *J. Helminthology.* 1951, v. 25, Nos. 1/2, 19–26, 2 figs.

Crewe, W. & O'Rourke, F. J. **The Biting Habits of *Chrysops silacea* in the Forest at Kumba, British Cameroons.** *Ann. Trop. Med. & Parasit.* 1951, May, v. 45, No. 1, 38–50, 1 map, 1 fig. & 4 graphs.

The Loiasis Research team at Kumba in the British Cameroons has been at work in the field for 18 months but, except for three adults of *Chrysops langi*, only adults of *Chrysops silacea* and *C. dimidiata* have been taken biting man in the township. The last two species are the only known vectors of loiasis to man in West Africa. On the other hand, adults bred out from 19 larvae collected from nearby streams, comprised 4 *C. silacea*, 1 *C. dimidiata*, 8 *C. longicornis*, 5 *C. langi* and 1 *C. griseicollis*. The last three species were previously unknown at Kumba and it seemed probable that they were forest dwellers, and possibly vectors of filarial worms similar to *Loa* which have been found both as microfilariae and adults in three species of *Cercopithecus* monkeys and one of *Mandrillus* inhabiting the forest canopy.

Field work was begun to explore these possibilities. The paper gives an account of the results obtained in a forested river gorge near the township. The site selected harboured numerous monkeys and chimpanzees. No breeding of *Chrysops* has been detected in the gorge or in the nearby margins of Lake Barombi, from which the River Kake emerges to its turbulent course in the

gorge : nor had adult *Chrysops* ever been taken in this gorge in earlier collections at ground level. However, the clearing made at the foot of a 50 ft. tree when the canopy platform was being erected resulted in *Chrysops silacea* appearing almost at once at the rate of 2·1 flies per boy-hour. Collections were begun then at ground and platform level. With the exception of 1 female of *C. langi* taken in the canopy, the flies taken were *C. silacea* and all of them were females. Over a seven-week period from April to June the flies were caught at the rate of 1·51 per boy-hour (forest floor), 0·54 per boy-hour (forest canopy), and 0·38 per boy-hour (in Kumba), and of 306, 109, and 52 dissected from each site respectively only 4, 0 and 2 individuals contained infective filarial larvae.

The daily biting cycle of *C. silacea* at the floor and in the canopy of the forest runs from about 7 a.m. to 6.30 p.m. with, possibly, peak biting periods in the morning and afternoon. Biting activity appeared to increase with temperature rises from 66° to 85°F., and to decrease as the relative humidity rose from 56 to 100 per cent.

Similar results were obtained during a second series of catches in October, but the fly density was generally lower.

The discussion which follows suggests that clearing of undergrowth increases the range of vision of *Chrysops* with a resultant concentration of the fly from some distance towards potential prey moving in the clearing. It is quite uncertain whether the filarial larvae in the forest-caught *Chrysops* were of human or simian origin. [See also GORDON *et al.*, this *Bulletin*, 1950, v. 47, 1214.]

D. S. Bertram

PUYELO, M. R. Le traitement de l'onchocercose humaine en Haute-Volta. Premier-essais chimiothérapiques par la notézine (3799 R.P.). [**The Treatment of Human Onchocerciasis in Upper Volta. Preliminary Chemotherapeutic Trials with Hetrazan.**] *Bull. Méd. de l'Afrique Occidentale Française*. 1950, v. 7, No. 2, 167–78. [22 refs.]

The substance of this paper is the same as that already abstracted in this *Bulletin*, 1951, v. 48, 182.

SCHÜFFNER, W. & BOOL, J. Retrograde Oxyuren-Infektion "Retrofektion". V. Mitteilung. [**Retrograde *Enterobius*-Infection, "Retrofection".**] *Zent. f. Bakt.* I. Abt. Orig. 1950, May 25, v. 155, Nos. 5/7, 229–34, 2 figs.

The essence of this paper is given in the abstract of a previous paper by SCHÜFFNER, SWELLENGREBEL and BOOL [this *Bulletin*, 1951, v. 48, 61]. It continues observations on the experimental infection of four adults by placing larvae of *Enterobius* on the anus. The larvae then entered the intestine and developed, so that infections were set up [see this *Bulletin*, 1949, v. 46, 858, 960 ; 1950, v. 47, 649, 876]. The infection in the youngest of the experimental subjects was of the retrofective type with a long prepatent period of 76 days, an observation that extended the life of the female worm from 93 to 101 days.

In Schüffner's own experimental infection the attack followed 43–60 days after the infection and was markedly of the retrofective type (type R), but, during its second year, it changed fundamentally. Eggs appeared more frequently, the rhythm was lost and towards the end of the year the infection became indistinguishable from the digital type (type D). The possibility that such a transition might occur had been suspected, but not proved before. Schüffner decided to find out whether mechanical interference with this infection could lessen it or at least bring it to a standstill. He therefore undertook washings of the anal region. Earlier work has shown that eggs laid on the perianal region are not infective until the infective larvae have developed in them, and that these larvae can develop under appropriate conditions in a

minimum time of 6 hours. The anal region must therefore be washed every 6 hours, *i.e.*, 4 times a day. Schüffner was not able to do this, but he washed 3 times a day, in the morning, in the evening and once during the day. This left 7 or 8 hours between the washings, or at night time 9 or 10 hours, so that larvae had opportunities to hatch out of the eggs. On the other hand, washing every 6 hours is rarely or never possible under natural conditions and might plague patients unnecessarily.

Figure 1 shows the results of these washings. They began on February 21 and continued for 101 days, which is the longest time the female is known to live. After this period the anus was washed only when sensations indicated that a worm had emerged. Till April 21 the washings seemed to have little effect, but then, *i.e.*, at the 60th day [see the following abstract], the number of worms suddenly decreased and only stragglers remained. For 101 days (till June 1) these stragglers could still arise from eggs derived from the period before the washings began. Anything appearing subsequently must have been derived from eggs which had escaped the washings.

The experiment clearly showed that one can markedly influence the infection by 8-hour washings of the perianal region, and that, in order to get rid of the worms completely, 6-hour washings must be strictly maintained, and that this applies especially to the night time when the female worm is especially active.

Discussing the possibility of transmitting eggs by the fingers to the mouth during this anal toilet, Schüffner points out that 6-hour washings would not, strictly speaking, in themselves prevent eggs being carried from the anus to the mouth by the fingers. After the washings female worms may still lay eggs and during the next six hours the fingers may come into contact with eggs that have not yet developed infective larvae in them ; but it has often been shown that larvae can develop in eggs while these are still on the fingers. In countries in which the custom of washing the anus with water after defaecation prevails, the risk of transmitting eggs from the anus to the mouth on the fingers may not be avoided and this may explain chronic infections ; but Schüffner's anal toilet involved handling the anal region 3 to 6 times every 24 to 48 hours and it decreased the number of worms. Schüffner therefore concludes that, in cleanly adults, finger transmission plays no part in the infection.

G. Lapage

Schüffner, W. Der dritte Infektionsweg für Oxyuren, die " Retrofection ". [**The Third Mode of Infection with *Enterobius*, " Retrofection ".**] *Zent. f. Bakt.* I. Abt. Orig. 1950, July 15, v. 155, No. 8, Bericht p. 416*.

This paper summarizes briefly the results recorded above, with the additional facts that the decrease of Schüffner's infection caused by the anal toilet occurred suddenly on the 60th day and that the experimental infection of one of the subjects (J. B.) ceased spontaneously as two of the others had done.

G. Lapage

Welcker, E. R. Oxyuriasis des Wurmfortsatzes—Appendicitis ex oxyure—Appendicopathia oxyurica—Lymphadenitis mesenterialis oxyurica. [Oxyuriasis of the Appendix—Appendicitis ex oxyure—Appendicopathia oxyurica—Lymphadenitis mesenterialis oxyurica.] [**Enterobiasis of the Vermiform Appendix.**] *Deut. Gesundheitswesen.* 1950, Mar. 16, v. 5, No. 11, 323–30. [16 refs.]

For long it has been known that, in many appendicectomies, the appendix is found to be free from the inflammation suggested by the clinical symptoms. In some of these cases enterobiasis of the appendix is found and this gave

ASCHOFF the occasion, through his pupil BRAUCH (*Beitr. path. Anat.*, 1923, v. 71, 207) to establish a clinical entity called *appendicopathia oxyurica*. The author quotes various explanations of the symptoms of this condition and adds that few clinicians recognize it. Usually *Enterobius* in the appendix is regarded as insignificant. The author's studies show that the worms can be of no importance, *i.e.*, when they do not liberate toxins or if their toxins are evacuated with the contents of the appendix or if there is no stagnation in the appendix and therefore no toxic action on its walls. It is difficult to say how often enterobiasis of the appendix is unimportant, but it is not rare.

On the other hand, if the worms penetrate the wall of the appendix, an intramural inflammation can result. Pain thus caused arises from the appendix itself and this condition is *appendicitis oxyurica*. This condition is, however, rare.

Experience shows that the normal transport of faeces from the appendix is upset extraordinarily often. The narrow lumen of the appendix and its narrow exit favour stagnation and the occurrence of inflammation and toxic action of any worms present. Then, apart from *appendicitis oxyurica* due to the entry of worms into the appendicular wall, the following processes may occur :—

1. Rarely the toxins of the worms act exclusively on the wall of the appendix, which then contains very numerous clumps of eosinophiles and the resulting symptoms may suggest appendicitis. There may be transient pain, localized in the ileocaecal region, similar to that of true catarrhal appendicitis, but there is no rise of temperature or leucocytosis. The toxic action, and therefore the clinical signs, are relatively slight and justify the name *pseudo-appendicitis oxyurica*.

2. A common condition, constituting, in the author's experience, about 15 per cent. of all appendicectomies, is due to more marked toxic action. The wall of the appendix shows clumps of eosinophiles. The toxic action extends to the appendicular and mesenteric glands, which are acutely swollen. An accute, non-specific condition of the mesenteric glands arises with enterobiasis, which the author (*Med. Welt*, 1942, v. II, 1219 and 1247) called *lymphadenitis mesenterialis oxyurica*. It is striking that, until very recently, in all papers quoted on enterobiasis of the appendix, the relationship between this enterobiasis and the changes usually present in the mesenteric glands, has been neglected. The author has studied more than 700 cases of mesenteric lymphadenitis, about a third of which were tuberculous. The other two-thirds were non-specific and among them 43 per cent. in Greifswald and over 50 per cent. in Cottbus had evidence of enterobiasis as well. In only 7·6 per cent. of appendicectomies the cause of which was unexplained, was enterobiasis present without changes in the mesenteric glands. Can it be proven that the changes in the glands are due to the enterobiasis ? The author discusses this question and concludes that it can. The eosinophilia always present in the appendicular wall can be attributed to the enterobiasis, although enterobiasis of the appendix can occur without it.

There are two clinical varieties of this form of enterobiasis of the appendix. The author names them *primarily acute* and *chronically recurrent*. Both occur chiefly in children and young people between the ages of 5 to 20, but rarely during the first 4 years of life, when the opening of the appendix into the caecum is still wide. This opening narrows from the 4th to 5th years, so that the stagnation of the contents of the appendix necessary for infection of it with *Enterobius* and for the toxic action of these worms, rarely occurs during the first four years. The condition is rare after the age of 20 because : (*a*) enterobiasis is rarer after that age ; (*b*) the lymphatic system does not then react so strongly.

The chronic recurrent form is characterized by attacks of abdominal pain of variable intensity lasting for hours or days. These may go on for years. They may be insignificant or they may suggest chronic recurrent appendicitis.

The primarily acute form may produce an alarming clinical picture dominated by severe pain arising in healthy patients with such suddenness that its onset can be determined to the minute. The clinical features suggest acute appendicitis and may lead to operation.

Thus the two forms are similar to acute and chronic appendicitis respectively. The following features distinguish them from appendicitis :—

In " lymphadenitis mesenterialis oxyurica " [L.M.O.], the pain is often not restricted to McBurney's point, but may take the form of umbilical colic. Change of the position of the pain is more pronounced in L.M.O., but is never caused by change of the patient's position. The intensity of the pain is irregular, often cramp-like and occurring in peristaltic waves. The pressure pain resulting from high rectal examination which occurs in true appendicitis is absent in L.M.O. This is regarded as an important differential feature.

In L.M.O. higher temperatures and leucocytosis subside more rapidly than in acute appendicitis.

These facts indicate that L.M.O. is not merely a localized condition. Operation never shows severe acute inflammation of the appendix. It always contains *Enterobius* and the glands are acutely swollen to the size of a bean or a hazel nut. The acute changes in them are due to the absorption of toxins. Explanations given by earlier authors of the pain are not adequate, because they attribute it to the effects of the worms on the appendix only, whereas the symptoms just described are explained by the changes in the glands. Further, removal of an acutely-inflamed appendix results in removal of the pain, but removal of an appendix infected with *Enterobius*, when there is mesenteric lymphadenitis, results in persistence of the pain for a day before it rapidly subsides (*i.e.*, when the source of the toxins causing the changes in the glands is removed) ; and appendicectomy always gives a permanent cure.

This condition is thus an important clinical condition which the author names *lymphadenitis mesenterialis oxyurica.* *G. Lapage*

Welcker, E. R. Askaridiasis und akute Mesenterialdrüsenveränderungen. [**Ascariasis and Acute Changes in the Mesenteric Glands.**] *Deut. Gesundheitswesen.* 1950, Apr. 13, v. 5, No. 15, 456–9. [20 refs.]

Recently [above] the author recorded four varieties of enterobiasis of the appendix and concluded that the variety which he called *lymphadenitis mesenterialis oxyurica* is an important clinical condition. He further describes this condition in this paper, but reports on a patient with symptoms suggesting it, whose appendix had been removed years before. This patient had, however, about 500 *Ascaris* in the small intestine.

Recent papers on ascariasis show that it is common in war-stricken areas, such as south and north-west Germany and especially in Württemburg. In Tübingen it increased from 16·7 per cent. in 1944 to 25 per cent. in 1946. In schools the percentage was 34 per cent. and in the small-farmer area around Tübingen 96 per cent. were found infected. The symptoms shown often suggest the lymphadenitis due to absorption of toxins from *Enterobius* in the appendix, and he has no doubt that changes in the mesenteric glands occur as a result of infection with *Ascaris*, provided that the right conditions for its occurrence exist, *i.e.*, if the ascariasis causes stagnation of the bowel contents. One can thus speak of *lymphadenitis mesenterialis ascaridiaca* [*sic*] as well as the

lymphadenitis due to *Enterobius* in the appendix. The two conditions differ as follows :—

1. True lymphadenitis mesenterialis due to ascariasis is less common, because ascariasis of the appendix and the conditions under which *Ascaris* toxins can operate are less common. *Ascaris* in the appendix usually does not cause any symptoms. When it causes the condition mentioned above, the symptoms produced, especially if they are transient, lead less often to surgical measures.

2. The ascarids themselves determine the conditions which lead to absorption of their toxins and consequent affection of the mesenteric glands. Such conditions are, for example, ileus, perforation of the bowel, peritonitis, cholecystitis. These cause much more severe and dangerous clinical pictures than does lymphadenitis due to *Enterobius* in the appendix, so that the symptoms obscure those of the lymphadenitis ; but the author is sure that, in most cases of severe surgical complications, a lymphadenitis of the glands due to *Ascaris* is present.

3. The surgical treatment of the two conditions is different. Lymphadenitis due to *Enterobius* in the appendix is an indication for removal of the source of the toxins by appendicectomy, which gives complete and permanent cure. Lymphadenitis due to *Ascaris* is not an indication for surgical measures, especially if, in its pure form, there are no severe complications. It is more often an indication for therapeutic removal of the ascarids, which leads to astonishingly rapid cure. When severe complications occur, surgical removal of the ascarids removes the conditions which allow toxic absorption of ascarid toxins and cures the lymphadenitis. But lymphadenitis due to *Ascaris* is rare in its pure form and the pure form is still more rarely recognized.

G. Lapage

LENDLE, L. & SCHNEIDER, H.-H. Zur Frage der Giftigkeit des Insecticids HCC als Oxyurenmittel. [**Toxicity of the Insecticide Benzene Hexachloride as a Remedy for Enterobiasis.**] *Klin. Woch.* 1951, June 1, v. 29, Nos. 21/22, 388–9. [16 refs.]

Benzene hexachloride (BHC) has recently been recommended for the treatment of enterobiasis [see this *Bulletin*, 1950, v. 47, 391, 486 ; 1951, v. 48, 62, 491]. The present authors studied its toxicity when given orally in different media and in repeated doses. In agreement with other workers [*e.g.*, MCNAMARA, and KROP, *Bulletin of Hygiene*, 1948, v. 23, 535, *bis*] they found that it is relatively slightly toxic when given to rats by the mouth in comparison with intraperitoneal administration. In rats the following were the acute lethal doses in mgm./kgm. :—

Technical BHC mixture 1,000 *per os* : 400 intraperitoneally. Pure gamma fraction (100–) 200 *per os* : 50 intraperitoneally. The present authors, like others, found little difference in the toxic values in different oils. When dissolved in oils or finely emulsified, BHC is less active than when it is poorly emulsified and given orally.

Repeated doses can have a cumulative effect because BHC is retained in organs rich in lipoids. The authors found that 25 per cent. of the acute lethal dose, given daily, produced convulsions and was fatal in 3 to 6 days [presumably in rats ; the animals used are not named]. Relatively more of the repeated doses is absorbed than of a single full dose. Patients should therefore be treated as much as possible with single doses and the technical mixture of BHC should be used, because this is, according to the authors' results, less toxic than the pure gamma fraction, and is more active. GRAEVE and HERNNRING (*Klin. Wschr.*, 1950, 622) found that the gamma fraction used by them caused, after one or several doses of 45 mgm., convulsions in several persons and they warn us

about its use as an anthelmintic. The results of McNamara *et al.* show that gamma BHC is excreted and absorbed from the gut only to a very limited degree. For man one would expect 300 mgm. intravenously or 6,000 mgm. orally to be fatal ; and the dose producing convulsions would not be much less. McNamara *et al.* reported that the toxicity of the gamma fraction to warm-blooded animals can be lessened by the presence of the alpha fraction. Experiments done by the present authors on earthworms and Enchytraeid worms failed to confirm this. They showed that the technical mixture of BHC, made up of the alpha, beta, gamma and delta isomers was just as active as the gamma fraction, but they could not explain why. The isomers tested lacked the unpleasant taste of the technical mixture.

Scheving and Vogelbach (*Naturwiss.*, 1950, p. 211) report that this taste is connected with the presence of heptachlorcyclohexane fractions. The present authors tested a preparation of gamma-heptachlorcyclohexane and found that its action on earthworms and Enchytraeid worms was like that of gamma BHC. *G. Lapage*

Trub, C. L. P. & Gaase, A. Eine Gruppenerkrankung und eine Epidemie an Trichinose und ihre Lehren für die Verhütung und Bekämpfung der Trichinose. [**A Group of Cases of Trichiniasis and a Trichiniasis Epidemic and their bearing on the Prevention and Control of Trichiniasis.**] *Arch. f. Hyg. u. Bakt.* 1951, v. 134, No. 3, 163–72. [27 refs.]

The authors briefly discuss the history of trichiniasis in Germany and Gaase's work [this *Bulletin*, 1945, v. 42, 481 ; *Bulletin of Hygiene*, 1943, v. 18, 209], on the use of rat-antigen for its diagnosis. They then describe two outbreaks of trichiniasis that occurred in 1950 at Düren and Meschede in Westphalia.

At Düren, near Aachen, three pigs were killed on January 9 and 27 and on February 2, 1950, and 31 people ate of the pork they provided. Between February 17 and March 8, 1950, 21 persons developed trichiniasis, 17 of whom were treated by doctors. Of these 17, 11 were treated in hospital and 3 of these died ; the 6 others were treated as ambulant cases. The symptoms of the remaining 4 were so slight that they did not seek medical aid.

Complement fixation, precipitin and intradermal tests were done, although relatively late in the disease, on 26 of the 31 people who ate the suspected pork. The results of these tests are tabulated. They show that 5 out of the 8 patients treated in hospital gave positive responses to complement fixation, precipitin and intradermal tests, 2 gave positive precipitin and intradermal tests only, while one, given only a complement fixation test, was negative. Each of the 4 ambulant patients examined was given only one of the three tests and all were positive. Four patients who did not need medical aid were all negative to complement fixation or intradermal tests. Among 10 persons who were not ill after eating the pork, 7 were positive to one or other of the three tests and were classified as cases of latent trichiniasis. Examination of the pork revealed *Trichinella* larvae in the pigs killed on January 9 and 27 and also in sausage made from the pig killed on January 27, but none in the pig killed on February 2. A kitchen-maid who ate flesh from this last pig did not become ill, but a cook who ate flesh from all three pigs died of trichiniasis.

The outbreak in Meschede began on September 26, 1950, with the illness of the relations and assistants of a butcher. The two earliest patients showed positive complement fixation reactions. By the end of December, 1950, 436 persons had trichiniasis. The extent of the epidemic was related to the 500 families who were the butcher's customers. Only 11 patients had to be treated

in hospital and none died. In this outbreak it was possible to do serological tests earlier in the course of the disease.

Up to the beginning of January, 1951, serological tests had been done on 417 of the 436 patients. The remainder could not be tested. Of the 417 patients, 361 (86·5 per cent.) were lightly or strongly positive. [The nature of the tests is not stated, but presumably complement fixation is meant.] Among these 361 it was possible to diagnose trichiniasis clinically in 314 (86·98 per cent.) while 47 (13·02 per cent.) were classified as cases of latent trichiniasis. Among the 417 persons tested 11 gave doubtful results, but later tests of these were positive, so that they could be reckoned as positive. One was put in the category " auto-inhibition " [" *Eigenhemmung* "] and 44 (10·5 per cent.) were negative.

Investigations among the families served by the butcher revealed, in addition to the 436 persons mentioned, 108 others who had bought sausage or meat from the butcher in August and September and these showed positive complement fixation reactions, although they had no symptoms. Investigation showed that 3·5 cwt. of sausage had been made from pig and cattle meat bought on Aug. 3, 1950, in the market and that the pigs bought came from a slaughter-house in which Polish pigs were killed. The sausage was sold from the middle of August till September 30, 1950. Attempts to trace the precise source of the *Trichinella* infection revealed the unreliability of the methods used for its detection. Before the outbreak occurred in Meschede, a worker in the slaughter-house that supplied the affected pigs, and the wife of another worker were already suffering from trichiniasis from eating uncooked samples of meat taken for examination for *Trichinella*. More careful examinations of the pigs failed to uphold the reliability of the inspection methods used. When two women, for instance, examined the same pig, one found no *Trichinella* larvae in 7 preparations, the other found one larva in 2 preparations ; when a second examination was made of 7 preparations from the same sample of meat, the first woman found 8 *Trichinella* larvae and the second woman again only one.

The incidence of the larvae in individual muscles is known, but the facts revealed by study of these two outbreaks support the view that positive findings in meat inspection for *Trichinella* depend only too easily on chance and negatives only too often on human inadequacy. It seems evident that meat inspection must be supported by other methods of examining the pigs. Digestion methods have been used and Gaase recommended serological tests of pigs and man for diagnosis, and others have supported his views. The results obtained will, however, depend on the quality of the antigen used and it is desirable to use more than one antigen. The skin reaction is not reliable as Gaase and others have shown and other tests are preferable. *G. Lapage*

STANYON, J. H. **Trichinosis in Sudbury, Ontario.** *Canadian J. Pub. Health.* 1951, May, v. 42, No. 5, 179–84.

" 1. Trichinosis may be more prevalent in Canada than formerly realized.

" 2. The etiology, pathology and symptomatology, and diagnostic features have been described.

" 3. Ten cases are presented briefly.

" 4. A plea is made for the prevention of this disease by warning the public of the danger of eating improperly cooked pork and pork products."

Aikawa, J. K., Harrell, G. T. & Miller, T. B. **The Immunophysiology of Trichinosis. Alterations in the Blood Volume and the Thiocyanate Space in relation to the Development of Humoral Antibodies in the Rabbit.** *J. Clin. Investigation.* 1951, June, v. 30, No. 6, 575–81, 1 fig. [14 refs.]

"1. Trichinosis, an extracellular infection, is accompanied in rabbits by clinical edema and an increase in the fluid space available for dilution of thiocyanate ions.

"2. The changes were interpreted as indicating an increase in permeability of the vascular tree, probably in the capillary wall, so that crystalloids were lost from the circulation into the interstitial spaces.

"3. Occasional discrepancies observed between the increase in thiocyanate space and the changes in weight suggest that cellular permeability is probably also increased to water and ions.

"4. A significant drop in hematocrit occurred ; in occasional animals it was accompanied by clinical jaundice and the appearance of icterus in the serum.

"5. The physiologic changes were maximal just before humoral antibodies (precipitins) appeared, suggesting that the alterations may have been due directly or indirectly to an antigen-antibody reaction.

"6. The clinical symptoms and signs of trichinosis are not solely due to mechanical blockage of capillaries or arterioles by migrating larvae, but are more likely the result of re-distribution of fluid in the extravascular spaces."

DEFICIENCY DISEASES

Prasad, B. G. **Assessment of Nutritional Status of School Children in Lucknow.** Reprinted from *Indian J. Pediatrics.* 1949, July & Oct., v. 16, Nos. 63 & 64, 113–52 ; 181–207, 21 charts. [41 refs.]

This report by a School Health Officer describes in great detail the assessment of the health and development of 139 boys aged 7 to 14 years in two Lucknow schools. Anthropometric data included measurements of weight, height, sitting height, chest girth, chest depth, bisacromial diameter, bisiliac diameter, intertrochanteric diameter, wrist girth, calf girth, arm girth, and thickness of skin and subcutaneous tissue over chest, abdomen and back. From these measurements the author calculated 12 different indices of nutrition, but concluded that none of these assessed the nutritional state of the children as well as a thorough clinical examination. Clinical assessments were made after the method of Sankaran's " defect score ", with minor modifications. A rough economic assessment of the children's families was also made. The nutrition of this small group of Lucknow boys was judged to be better than that of the majority of Indian children, but was below accepted standards for children in the U.S.A. and the U.K.

[This report is presented with a full discussion and with references to the Indian literature. It will clearly be of great value to School Medical Officers in India. Unfortunately space has not been found for the publication of the protocols of the measurements and examinations of the individual children. It is to be hoped that these will be preserved in the Lucknow University Library and made available. Others interested in the correlation of physical growth and physical status may wish to work on this valuable raw data, so carefully collected.] *R. Passmore*

Berman, Charles. **Primary Carcinoma of the Liver.**

This book was reviewed on p. 845.

SPRUE

MEYER, L. M., SUAREZ, R. M., MARTINEZ, E. & SUAREZ, R. M., Jr., with the technical collaboration of Clemencia BENITEZ GAUTIER. El efecto de la administración oral de vitamina B_{12} y acido folico en dosis subminimas en el espru tropical. [**The Effect of Administration of Vitamin B_{12} and Folic Acid orally in Subminimal Doses in Tropical Sprue.**] *Bol. Asoc. Med. de Puerto Rico.* 1951, May, v. 43, No. 5, 251–62, 7 graphs. English summary.

This is a study of much interest. The authors had been testing for more than 2 years the effect of vitamin B_{12} orally in single doses of 100 to 500 microgrammes, but failed to observe any material change, either clinically or haematologically. In pernicious anaemia also the results were far from satisfactory. British authors had reported no benefit from the daily administration of 5 microgrammes, and 80 microgrammes daily for 15 days had but little effect ; a single large dose of 3,000 microgrammes did, however, produce an excellent haematological response.

Details are given of 7 patients suffering from sprue. Four were women aged 23, 26, 32 and 40 years, and three were men aged 55, 60 and 64 years. Four were given 25 microgrammes of vitamin B_{12} and 1·67 mgm. of folic acid daily. This method produced good clinical and marked haematological response. Three others received 10 microgrammes of the vitamin and 0·67 mgm. of folic acid ; the results were disappointing. Ascorbic acid, 1 gm., was given intravenously to some but no greater benefit was observed, nor did the administration of single doses of 100 microgrammes of the vitamin. Simultaneous administration of the vitamin and folic acid is better than either singly and better than larger doses of the vitamin, but folic acid in daily doses of 10 mgm. proved as beneficial as the smaller doses of the two together. Where the anaemia is marked or there is much intestinal parasitism a combination of the vitamin and folic acid with ferrous sulphate, named Rubriferrate, proved useful.

H. Harold Scott

SUAREZ, R. M., MARTINEZ, E. C., SUAREZ, R. M., Jr. & ELIAS LATORRE, Adelaida. El efecto del factor citrovorum (leucovorin) sobre el cuadro hematologico y las manifestaciones clinicas y neurologicas del espru tropical. [**Effect of the Citrovorum Factor on the Haematological, Clinical and Neurological Features of Tropical Sprue.**] *Bol. Asoc. Med. de Puerto Rico.* 1951, June, v. 43, No. 6, 319–26, 2 graphs. [10 refs.]

The English summary appended to the paper is as follows :—

" We have presented our observations on two acute sprue patients treated with citrovorum factor (CF).

" One was a 42-year old man who was also an epileptic and alcoholic addict. He received 1 cc, equivalent to 20 millions units, daily intramuscularly for 5 days. There was a submaximal reticulocyte response and a good clinical and hematologic response which persisted for over 30 days.

" The other was a 65-year old woman who showed with the typical picture of sprue, signs and symptoms of combined system disease of moderate severity. She was given 1 cc daily injections for 26 days. The reticulocyte response was adequate and the clinical and hematologic improvement was good. Some of the neurologic signs and symptoms either improved or disappeared, but there was no change observed in the deep tendon reflexes.

" The study of these two cases seems to show : (1) that the administration of 1 cc daily of citrovorum factor for 5 days is inadequate for the production of a maximal reticulocyte response, (2) that the administration of citrovorum factor

in doses of 1 cc daily for 26 days improved some of the neurological manifestations of sprue, but (3) we must admit the possibility that a more prolonged administration of C.F. might have affected unfavorably the neurologic manifestations."

HAEMATOLOGY

WELCH, G. K. & WALTHER, W. W. **Rapid and Simple Method of Estimating Haemoglobin.** *Lancet.* 1951, Mar. 10, 548–9.

The authors confirmed the claim that, in estimating haemoglobin by oxyhaemoglobin methods, the conversion of even 10 per cent. into carboxyhaemoglobin or methaemoglobin caused an error in the density reading of less than 1 per cent., and observed that, since the former substance raises the density reading and the latter decreases it, mixtures tended to eliminate even this error.

This decided them to use an oxyhaemoglobin colorimetric method for rapid and accurate haemoglobin estimations. They chose the "E.E.L." photo-electric test-tube colorimeter. This is in fact an absorptiometer which measures from 0 absorption at full deflection to 100 absorption at no deflection when absorption is complete, and the reading on this scale is in direct proportion to the light absorbed.

The authors obtained haemoglobin readings by the following method. Their photo-electric colorimeter was fitted with an adaptor for 7/16-inch tubes; they used a green filter (tricolour no : 404), standard 20 cmm. pipettes, and approximately 1 per cent. solution of ammonium hydroxide in distilled water. The 7/16-inch tubes were calibrated as follows :—

Ten ml. of blood from a healthy person is taken into a tube containing 100 units of heparin, and mixed.

The haemoglobin value of the blood is found by the alkaline-haematin method and converted to the Haldane scale.

One ml. of heparinized blood is added to 90 ml. of 1 per cent. ammonium hydroxide solution in a volumetric flask and the volume is made up to 100 ml.

Two ml. quantities of this solution (20 cmm. of blood) are placed in the colorimeter tubes to be calibrated.

The zero reading is obtained : then each tube is placed in the colorimeter in turn and its contents are diluted until the reading is exactly half the known haemoglobin (Haldane) percentage of the sample. The tubes are marked at the lower meniscus.

A correction can be made for bile pigment by repeating the test after centrifugation and subtracting the reading from that obtained with laked blood.

This method is rapid because drying the tubes is unnecessary, it is as accurate as the alkaline-haematin method which takes longer, the readings do not change if the oxyhaemoglobin solution is left overnight, and the method is very simple.

L. E. Napier

SHAPIRO, M. **Further Evidence of Homogeneity of Blood Group Distribution in the South African Bantu.** *South African Med. J.* 1951, June 16, v. 25, No. 24, 406–11.

LAMBOTTE-LEGRAND, J. & LAMBOTTE-LEGRAND, C. L'anémie à hématies falciformes chez l'enfant indigène du Bas-Congo. [**Sickle-Cell Anaemia in African Children in the Lower Congo.**] *Ann. Soc. Belge de Méd. Trop.* 1951, Apr. 30, v. 31, No. 2, 207–34, 1 graph, 1 text fig. & 2 figs. on pl. [36 refs.]

In this study the authors discuss at length the nature, distribution, genetics, clinical features and diagnosis of the sickle-cell trait and sickle-cell anaemia ; there is a brief note on prognosis and treatment of the latter. Figures given by authors in other parts of Africa are tabulated and one of the authors' cases is described in very great detail. Clinical observations are based on 100 cases.

In Léopoldville, sickling was found in 24 per cent. of 392 African infants and 23·1 per cent. of 303 schoolchildren. The incidence and intensity of the sickling increased during the first weeks of life, ranging from 7·5 per cent. carriers with an average of 38 per cent. of sickle cells in 53 infants under two weeks old to 21 per cent. carriers with an average of 70 per cent. sickle cells in 66 children of 4 months old. The heredity is of the dominant type.

In Léopoldville about 6 per cent. of carriers of the trait develop sickle-cell anaemia, usually between 4 and 8 months. Mortality is greater in the second semester. In 98 children affected, 80 had parents who carried the trait, illustrating the link between the disease and homozygotism.

Reference is made to the existence of a " non-anaemic " form of the disease.

A more detailed account of this study is to be published elsewhere.

H. J. O'D. Burke-Gaffney

FOY, H., KONDI, Athena & BRASS, W. **Sickle-Cell Disease of Africans in Kenya.** *East African Med. J.* 1951, Jan., v. 28, No. 1, 1–5, 2 figs. on pl.

This investigation is an attempt to explain the anomaly that whereas the sickle-cell trait (heterozygous) is very common in Africa, the incidence being as high as 45 per cent. in some African tribes, sickle-cell anaemia (homozygous) is rare, occurring in not more than 1 in 1,000 of those with the trait.

This paper is by way of being a preliminary note, as only 27 infants under one year of age and 27 mothers, of the Jaluo tribe, have been investigated to date. Of the 54 persons, 13 showed the sickle-cell condition ; of these, 4 showed the disease and 9 the trait only. The authors calculate that if 1 in 30 of those showing the trait had sickle-cell anaemia (*cf.* 1 in 50 in the U.S.A.), the probability of 4 or more with the anaemia occurring in a sample of 13 is close to 0·0007.

Of the 27 infants, 3 showed the disease and 4 the trait. This suggests that there is a high mortality among persons with the anaemia (homozygous).

" These findings of abundant sickle-cell anaemia among those African tribes that have high sickle-cell trait rates [if confirmed on larger samples] clear away the genetical anomaly that has always existed ", namely, that, although the disease is considered to be transmitted as a Mendelian dominant, the homozygous state was rare in a community with a high heterozygous rate.

L. E. Napier

FOY, H., KONDI, Athena & ALEXANDRIDES, C. **Sickle-Cell Trait and Sickle-Cell Anaemia.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, June, v. 44, No. 6, 729–40, 4 charts & 2 figs. on pl. [19 refs.]

A typical case of sickle-cell anaemia is described in a Greek girl. Her mother's cells showed sickling, but her father's cells were normal. Negro ancestry or illegitimacy can be excluded. It is widely believed that a single dose of the

gene produces sickling and a double dose the anaemia. As the trait is so common in many African tribes the anaemia should also be common, yet this has been denied. The authors are working on this problem, their tentative conclusion being that the anaemia is indeed very common in Africans, but that it is easily overlooked as many deaths occur *in utero* or very early in life.

J. A. Fraser Roberts

INGBAR, S. H. & KASS, E. H. **Sulfhydryl Content of Normal Hemoglobin and Hemoglobin in Sickle Cell Anemia.** *Proc. Soc. Exper. Biol. & Med.* 1951, May, v. 77, No. 1, 74–6. [17 refs.]

"1. The titratable SH content of hemoglobin was determined amperometrically in saline, and found to approximate 2 moles SH per mole of normal hemoglobin and 3 moles SH per mole of hemoglobin from patients with sickle cell anemia. 2. The SH content of hemoglobin from two patients with sickle cell trait was greater than that of normal hemoglobin and less than that of sickle cell anemia hemoglobin suggesting that a mixture of the two types of hemoglobin was present in these patients."

AUBRY, G., BOULARD, C., PORTIER, A., MESSERSCHMITT, J. & MASSONNAT, J. Un cas de maladie de Cooley chez une indigène algérienne. [**A Case of Cooley's Anaemia in a Native of Algeria.**] *Algérie Méd.* 1950, Jan., v. 54, No. 1, 21–4.

HAMILTON, H. E. & FOWLER, W. M. **Familial Leptocytosis (Cooley's Anemia and Cooley's Trait). Observations on Three Families, with a Related Study of Bone Marrow Activity.** *Arch. Intern. Med.* 1951, June, v. 87, No. 6, 825–34, 1 coloured pl. [Refs. in footnotes.]

MESSERSCHMITT, J. Les anémies macrocytiques. [**The Macrocytic Anaemias.**] *Algérie Méd.* 1950, May, v. 54, No. 5, 239–51, 1 fig. [31 refs.]

A general review.

VENOMS AND ANTIVENENES

LEFROU, G. Deux cas de morsure par le serpent *Dendraspis viridis* suivis de guérison. [**Two Cases of Snake-bite by *D. viridis*. Treatment resulting in Cure.**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 3/4, 234–9.

These two cases are instructive. The first patient was a robust young man who was bitten near the knee when he was climbing a palm tree to gather the fruit. The second was bitten when capturing the snake which had been brought to the ground from a tree. The snake, *Dendraspis viridis*, is well known and rightly dreaded as its bite is often, one might say usually, fatal. It is a proteroglyphus Colubride, is very agile and very aggressive and is regarded as "the most dangerous of African snakes". The first patient cycled to Pastoria, threw himself off, took a few steps and fell collapsed on the verandah of the laboratory. He lay inert, almost pulseless and comatose, his breathing was diaphragmatic and difficult. He seemed to be at death's door and there was no time to waste, for his exertions had caused dispersion of the poison and the usual subcutaneous injection of antivenene would be too slow. An iron lung to maintain respiration was not procurable and treatment consisted in intravenous injection of 20 cc

antivenene and 10 cc. of camphorated oil ; injection of sulphate of strychnine (0·005 gm.) subcutaneously, 20 cc. of the antivenene intramuscularly and 20 cc. more subcutaneously. No local treatment was adopted because the poison had already been widely diffused. For a quarter of an hour death appeared to be imminent ; then the patient became restless and complaining—a good sign—and asked for a drink, but after a few gulps he vomited abundantly. Thereafter symptomatic treatment was continued, injection of the camphorated oil and of the strychnine if he became drowsy. The leg became swollen and the oedema spread to the thigh ; he was given a local injection of 200,000 units of penicillin to combat infection. The swelling began to subside on the 4th day and on the 7th there was only a little oedema of the foot and the patient returned to his home.

The second patient was bitten on the index finger ; he was treated on similar lines, but he was seen sooner and a tourniquet had been applied and his symptoms were less serious.

The usual instructions on the use of the antivenene are that it should be given subcutaneously ; this the author regards as regrettable because, as the cases above show, if circumstances are urgent it may be necessary to administer it intravenously. *H. Harold Scott*

VACHON, M. Etudes sur les scorpions. [**Studies on Scorpions.**] *Arch. Inst. Pasteur d'Algérie.* 1948, Sept. & Dec., v. 26, Nos. 3 & 4, 288–316, figs. 148–187 ; 441–81, figs. 188–241. *Ibid.* 1949, Mar., June, Sept. & Dec., v. 27, Nos. 1, 2, 3 & 4, 66–100, figs. 242–92 ; 134–69, figs. 293–363 ; 281–8, figs. 364–71 ; 334–96, figs. 372–476. *Ibid.* 1950, June & Sept., v. 28, Nos. 2 & 3, 152–216, figs. 477–557 ; 383–413, figs. 558–636.

SERGENT, E. De la sérothérapie antiscorpionique chez les jeunes enfants. [**Antivenene Treatment of Young Children stung by Scorpions.**] *Arch. Inst. Pasteur d'Algérie.* 1951, June, v. 29, No. 2, 123–4.

This is a short note, but on a point of great importance in the treatment of scorpion stings, indicating the need for careful observation after serum treatment to all appearances successful, and confirming what Etienne SERGENT has said, that even when the condition of a patient stung by a scorpion has apparently become normal after the first injection of serum, he must be carefully watched for some hours in order that a fresh injection may be given should severe symptoms return, as they may do several hours after a deceptive improvement.

The author records two cases of his own and one reported to him by the Director of the Pasteur Institute, Tunis. The first was a child [age not stated] who was brought to the doctor 45 minutes after being stung. The pulse was weak, rapid and irregular, respiration shallow and dyspnoeic, vomiting uncontrollable, sweating profuse with restlessness and convulsions ; temperature 38·2°C. Thirty cc. of antiserum were injected subcutaneously and intramuscularly and ½ hour later 10 cc. intravenously. Improvement was " spectacular and almost immediate ", but the restlessness persisted. Three and a half hours after the stinging, another 10 cc. were injected subcutaneously " to consolidate cure ", but 7½ hours later the child was found in a very serious state, prostrated and collapsed, and with a temperature of 39·5°C. Another 20 cc. of the serum were injected subcutaneously. The child's condition remained very grave all that day, but was much better on the following day and rapidly normal health was regained. Altogether 70 cc. of the antivenene were administered.

The second child was not seen until 2½ hours after the event ; he was given 30 cc. of the serum but died 7½ hours later.

The third, the reported case from Tunis, somewhat resembled the first. The child had had two injections of the serum but was still very ill and the doctor had telephoned for advice. He was told not to give up hope but to double the dose. Two days later all was well.

To sum up : in stinging of young children by scorpions the antivenene should be given in large dose and repeated if need arises ; anyway, careful observation should be given for several hours. *H. Harold Scott*

Maretić, Z. Beobachtungen über Pathologie und Klinik des Latrodektismus in Istrien (1948–1950). [**The Symptoms and Pathology of** *Latrodectus* **Poisoning in Istria, 1948–1950.**] *Acta Tropica.* Basle. 1951, v. 8, No. 2, 136–44, 3 figs. [11 refs.]

During the period referred to, 1948–50, more than 50 cases of spider-bite have been reported in Istria, on the Adriatic, and the majority have been by *Latrodectus tredecimguttatus*. Of 35 treated in the Pula Hospital 26 were bitten by this spider, 4 by *Tarantula apuliae* ; 5 were not identified. The general populace who do not know one spider from another commonly ascribe to the larger and much-dreaded Tarantula bites due to the smaller and less-feared (because of its handsome appearance) *Latrodectus*, but those patients who show serious symptoms have usually been bitten by the latter.

The author describes the symptoms produced. The actual bite is not painful at the time and the patient tends to disregard it, but after about 10 minutes paraesthesia and pain ensue, at first in the limbs but soon distributed generally over the whole body, with cutaneous hyperaesthesia ; respiration is rapid and shallow, perhaps stridorous, or there is aphonia with some rise of temperature, at most to 39°C. The patient may toss about in bed, crying out with the pain, which necessitates the use of morphia. Convulsions with trismus are nearly always present ; the cerebrospinal fluid is under increased pressure, the skin and mucous membranes are hyperaemic ; oliguria is fairly constant ; hyperglycaemia and glycosuria may be present and there may be a leucocytosis up to 18,000 per cmm., but the average is 11,000 ; a maculo-papular rash is common. The average length of stay in hospital is 8·4 days, but convalescence is slow, one to even three months passing before recovery is complete.

Records of experimental work on kittens are given and photographs of one five minutes after being bitten ; another 15 minutes after, when paralytic symptoms appear and a third after 40 hours when the animal is emaciated and comatose. At autopsy there is general congestion, the liver is hyperaemic and oedematous, there is acute nephrosis with parenchymatous degeneration of the tubules of the kidney, and cerebral oedema and hyperaemia, and oedema of the lungs. *H. Harold Scott*

Hornabrook, R. W. **The Katipo Spider.** *New Zealand Med. J.* 1951, Apr., v. 50, No. 276, 131–8. [12 refs.]

Latrodectus katipo (katipo is the Maori term meaning "night-stinger") is a species fairly closely allied to *L. mactans*, or Black Widow spider of America. It is also nearly related to *L. hasselti* and is widely distributed over the North Island beaches, less so in the South. It has a bright red stripe on a jet-black globular body. The spider lurks on the beaches and, speaking generally, the symptoms produced do not seem to be quite so serious as those resulting from bites by the Black Widow ; nevertheless fatal cases have been recorded. Bacterial contamination of the wound is not uncommon and may be held accountable for the degree of severity of some of the cases. The author gives notes of a number of instances culled from New Zealand medical literature.

In general, pain (both local and generalized), shock and perhaps collapse are predominant features. Respiratory distress, rashes and retention of urine have been recorded. Muscular paralysis in the affected limb occurred in one case, muscle cramps in another and prolonged muscle weakness in three. Apart from the complicating evidence of infection, the symptoms are very variable and it is evident that no two cases are exactly alike.

Treatment consists of the local application of ammonia, free incision and sucking the wound; otherwise it is symptomatic, for example, with digitalis, ether or other stimulant for the collapse. *H. Harold Scott*

ORDMAN, D. **Bee Sting Sensitivity and Desensitization with Bee Body Extract by the Intracutaneous Route.** *South African Med. J.* 1951, June 16, v. 25, No. 24, 411–13.

Hypersensitivity to stinging by the honey bee (*Apis mellifica*), it appears, is associated with the body protein of the insect present in the venom rather than with the injected venom itself. The author has prepared an extract for testing sensitivity to the poison and for procuring desensitization. His procedure is as follows: the bees are killed with chloroform, washed with ether and when dry are ground in a mortar and extracted with Coca's fluid for 48 hours. The fluid collected by squeezing through a cloth is filtered and tested for sterility. The bee protein is obtained from this by precipitation with alcohol and after washing with ether and grinding results in a dry powder which is stored for dilution later. It is standardized according to the total protein nitrogen of the product. A skin test outfit is available containing graded strengths of the extract up to 2,000 units per cc. and tests are carried out, starting with 0·02 cc. of the one unit per cc. strength injected into the skin of the forearm and increased at intervals of 20–30 minutes until a weal 0·5 cm. in diameter with surrounding erythema is produced. Thereafter desensitization is carried out by injections every 2–3 days (longer if evidence of response to the preceding injection persists). When the doses reach the higher ranges of 1,000 units the intervals between the injections are increased to weekly, monthly or even longer, to maintain the desensitization. Brief notes of 3 patients are given in which this desensitization was satisfactorily attained; they had earlier shown very marked hypersensitivity to the sting. *H. Harold Scott*

TROPICAL OPHTHALMOLOGY

ROBINEAU, A. Le trachome au Soudan français. [**Trachoma in French Sudan.**] *Algérie Méd.* 1950, Jan., v. 54, No. 1, 11–13.

The author attempts to arrive at the incidence of trachoma in the French Sudan from the following sources:—

(1) Annual Medical Reports. For the years 1946–1948, trachoma is shown as 0·2 to 0·4 per cent. of the general morbidity in respect of outpatients and 0·012 to 0·017 per cent. in in-patients. The incidence as a proportion of ocular affections is difficult to establish, as trachoma is not recorded separately. Reports from different districts show great variation over the years, fluctuating, for example, between 1 case and 138 in one district and 17 cases and 398 in another. It is clear that none of these statistics is of value in estimating the distribution of trachoma.

(2) District Ophthalmological Inspections. In 1945, a local medical officer recorded 28·6 per cent. and more of cases of trachoma among 3,689 people in

part of one canton. In 1946, the Chief Medical Officer of the Ophthalmological Centre in the Sudan inspected some of the larger villages in the Niger area of north-east Sudan and found from 3·2 to 25 per cent. of cases in schools. Similar figures were recorded among villagers.

(3) Out-patient records at the Ophthalmological Centre. The percentage of new cases of trachoma in Africans recorded in 1946–1948 were as follows: 1946, 12·5 of 1,958; 1947, 11·4 of 2,932; 1948, 10·8 of 3,803. The number of cases in non-natives seen in the three years was 4, 1 and 1 respectively.

Trichiasis was found chiefly in adults, but was not uncommon in children between 5 and 10 years.

It is proposed to create a Trachoma Institute at Bamako.

H. J. O'D. Burke-Gaffney

LACORTE, J. G. Vírus oftalmotrópicos. Os vírus do tracoma e da conjuntivite com inclusões. [**Ophthalmic Viruses; Trachoma and Conjunctivitis.**] *Rev. Brasileira Med.* Rio de Janeiro. 1951, May, v. 8, No. 5, 334–41, 2 figs. [105 refs.]

This is a good review article abundantly documented. The author deals first with trachoma, its causation, its pathogenesis for man and animals, the pathological anatomy and histology, diagnosis, epidemiology and treatment. Next, the virus of conjunctivitis, its isolation, properties, inclusions, and its cultivation, and then, as with trachoma, its pathogenesis, diagnosis, epidemiology and treatment. Like all publications issued from the Oswaldo Cruz Institute it is very comprehensive. *H. Harold Scott*

DELANOË, E. Incidence du darmous sur le trachome. [**Influence of Darmous on Trachoma.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 395–8.

"Darmous" is a name given in Morocco to a chronic fluorosis affecting the teeth, caused by constantly breathing air impregnated with the dust of phosphates. The author, working in Kouribga, Morocco, which is the centre of the phosphate mining industry, examined the eyes of 316 Moroccan schoolboys and girls, 115 European schoolchildren and 51 Arab adults working in the mines. He came to the conclusion that the powder of the phosphate has a sterilizing effect on trachoma, both mechanically and therapeutically. He also observed that workers in the mines rarely had the necessity to come to hospital for ophthalmic treatment. *E. W. O'G. Kirwan*

HEAT STROKE AND ALLIED CONDITIONS

HORNE, G. O. & MOLE, R. H. **Mammillaria.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Feb., v. 44, No. 4, 465–71, 5 figs. on 2 pls.

This interesting paper, illustrated by excellent photographs, describes the appearance of the mammillaria which is the skin lesion associated with anhidrotic heat exhaustion [this *Bulletin*, 1951, v. 48, 79]. The appearances of mammillaria are as follows:—

The affected skin is studded with pale firm elevations giving a "cobblestone" appearance. The closely packed elevations are roughly circular and about 1 mm. in diameter. They bear no constant relation to hair follicles or to the openings of sweat ducts. They are pale and appear to contain less blood and less melanin than the surrounding skin. The affected skin feels rough like the studs of a nutmeg grater.

Mammillaria is uniformly distributed from below the level of the neck over the anterior, posterior and lateral aspects of the trunk (but not in the axilla) as far down as the waist and over the lateral aspects of the upper arms.

The description above applies to the resting individual, but after exposure to heat or physical exertion, each lesion becomes much more prominent both to the eye and to palpation.

Mammillaria may persist for varying lengths of time and the restoration of the skin to normal is a slow process. It has been seen to last for as long as 4 months, 3 of these in the temperate climate of Britain.

Mammillaria is an invariable feature of anhidrotic heat exhaustion in humid climates, but it occurs much more commonly than anhidrosis and is usually symptomless. This was well shown in 1946 at Karachi when on a day in July 38 per cent. of all members of the hospital staff were found to have generalized mammillaria. [CLARK (unpublished) confirms this from Aden where he found many cases of mammillaria unassociated with symptoms of anhidrotic heat exhaustion, the impairment of heat loss being adequately compensated in some way.]

The authors have never seen mammillaria develop without a history of preceding prickly heat in the humid climate of Karachi although in hotter and drier climates mammillaria may not follow prickly heat [LADELL, WATERLOW and HUDSON, this *Bulletin*, 1945, v. 42, 143]. O'BRIEN [*ibid.*, 1948, v. 45, 361] stated that it was possible to restore sweating on a dry area of mammillaria by the topical application of anhydrous lanoline and gave a striking photograph illustrating this "lipoid response". The present authors obtained a similar result in repeating the experiment in a temperate climate on a normal subject. Their explanation is that the application of fat to the skin prevents the evaporation of sweat, while visible sweat fails to appear on the rest of the skin because in a suitable environment the sweat is evaporated as fast as it is formed. In other words, inapparent perspiration is rendered visible. O'Brien [below] denies this, as in his opinion inapparent perspiration from the skin is far too scanty to account for the flood of fluid seen on the lipoid response. [A. N. G. Clark (unpublished) as a result of his observations in Aden, believes that the lipoid response is due to two factors in mammillaria : (i) an increased diffusion of tissue fluid through the skin on account of the greatly increased fluid content of the dermis in mammillaria; (ii) an actual egress of sweat through obstructed pores and release of the retained sweat in the dilated ducts. This, however, need not be due entirely to the potential axial lumen becoming patent as suggested by O'Brien, but to a generalized increase in permeability of the keratin layer as a whole. Further work on the nature of the lipoid response in the normal skin and in mammillaria under controlled conditions in a hot chamber is obviously indicated.]

Anatomical.

O'Brien [*loc. cit.*] and SULZBERGER *et al.* (*J. Invest. Dermatol.*, 1946, v. 7, 153) demonstrated that the lumen of each sweat duct in mammillaria was occupied by keratin and claimed that this keratin obstructed the sweat ducts and caused their rupture or dilatation when sweat was secreted subsequently. The present authors criticize these findings, stating that this complete blockage cannot be demonstrated except by sections in the plane perpendicular to the tube. They failed to get fluid on pricking the elevations of mammillaria, even after these were rendered prominent after exercise, and state categorically that a wide experience of mammillaria at Karachi made it impossible to accept that the elevations are fluid-containing vesicles.

It is difficult, however, to find an explanation for their observation that after exercise or exposure to heat each lesion becomes much more prominent both

to the eye and palpation, and later on, in paragraph 4, page 466, they state " the lesions become less conspicuous as the individual rests and cools off ". If the lesions do not contain fluid, what is the explanation ? They offer no explanation as to what these papules are apart from dismissing O'Brien's view.

[The authors, together with ALLEN and O'BRIEN [this *Bulletin*, 1945, v. 42, 313], WOLKIN, GOODMAN and KELLEY [*ibid.*, 1944, v. 41, 785], are to be congratulated on describing a new and important syndrome, anhidrotic asthenia and mammillaria, which has eluded the clinical observers of the past. The two papers by Horne and Mole [*loc. cit.*] should be read together with that of O'Brien [*loc. cit.*]. Although they differ from the latter as regards the nature of the lipoid response and the aetiology of the lesion of mammillaria their general description of this recent entity is similar and any minor differences can be explained by variations in climates and working conditions.]

T. C. St. C. Morton

O'BRIEN, J. P. **Anhidrotic Heat Exhaustion (Anhidrotic Asthenia) and Mammillaria (Miliaria Profunda).** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Aug., v. 45, No. 1, 139–43, 2 figs. on pl. [12 refs.]

O'Brien in his letter to the *Transactions of the Royal Society of Tropical Medicine and Hygiene* criticizes the paper by HORNE and MOLE on mammillaria on the following grounds, although he agrees with their clinical findings.

His two main contentions are that he did not base his explanation of the pathology of mammillaria on demonstrating that the elevations contained fluid but on careful serial sections demonstrating a blockage of the sweat ducts by a keratin plug leading to duct rupture and duct dilatation, also by his explanation of the lipoid response.

He agrees that transverse sections of the sweat ducts are advisable in order to demonstrate this and points out that his original paper contains one illustration (plate 21) of a transverse section.

[Horne and Mole do not give any description of their histological findings in mammillaria, but A. N. G. CLARK (unpublished) has made careful serial sections in Aden, and although these were carried out in vertical sections, his findings are identical with those of O'Brien, although his explanation of the " lipoid response " as given in the abstract of the paper by Horne and Mole differs slightly from that of O'Brien, but does tend on the whole to reconcile the differences. He, however, found that the use of keratolytic agents in acute miliaria rubra causing marked desquamation frequently produced the lesions of mammillaria ; in other words treatment appeared to convert miliaria rubra into the symptomless phase of mammillaria. The disappearance of itching on the appearance of mammillaria following prickly heat has been mentioned by both O'Brien and Horne and Mole, but no explanation has been given as to the reason for this phenomenon. Further histological evidence and carefully controlled experiments as to the nature of the " lipoid response " are obviously indicated.]

The reviewer agrees with the suggestion made in his letters by O'Brien that the term anhidrotic heat asthenia should be used in preference to anhidrotic heat exhaustion in order to avoid confusion with heat exhaustion due to chloride deficiency. [Whether " mammillaria " or " miliaria profunda " (SHELLEY *et al.*, *Medicine*, 1950, v. 29, 195) is the better term to describe the skin lesions of this interesting condition is a matter of choice. The term

" miliaria alba " suggested by the reviewer for mammillaria [this *Bulletin*, 1951, v. 48, 79] is unfortunately inadmissible as it has been used for another condition ; " miliaria pallida " as an alternative synonym is suggested.]

T. C. St. C. Morton

TROPICAL ULCER

PIGANIOL, FUS & RAJAOBELINA. Quelques résultats de traitement des ulcères tropicaux par les injections intra-artérielles. [**Some Results of Treatment of Tropical Ulcers by Intra-Arterial Injections.**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 3/4, 265–7.

The cases dealt with were mostly long-standing ulcers of the legs in which standard methods of treatment had been unsuccessful. Each week during treatment a tracing of the lesion was taken after dressing with methylene blue, and successive tracings were superimposed. Injections were given twice weekly into the femoral artery in Scarpa's triangle, the first two or three being 10 ml. of 1 per cent. novocaine, subsequent ones being of 5 to 10 ml. of 2 per cent. mercurochrome. As many as 15 injections were given.

With the patient lying down the injection is made vertically at a point midway between the anterior superior iliac spine and the spine of the pubis. At this point the artery is felt and controlled between two fingers. No ill effects have been observed.

The number of patients treated by this method is not given, but the authors consider their results to be very good. Several cases are described in detail : one patient with a strongly positive blood Wassermann reaction and a subjacent periostitis of the fibula was very resistant to treatment and required a resection of the affected periosteum. No description is given of the local treatment used.

C. F. Shelton

SERVINO, V. **A Note on Tropicaloid Ulcer (Castellani). Its occurrence in Italy.** *J. Trop. Med. & Hyg.* 1951, July, v. 54, No. 7, 147–8.

The author discusses the clinical and bacteriological features of tropicaloid ulcer : these have already been noted in CASTELLANI's paper [this *Bulletin*, 1948, v. 45, 1116].

He then observes that true tropical ulcer is very rare in Italy, if it occurs at all. Pyogenic ulcer does occur and, rarely, diphtheritic ulcer.

Two cases of tropicaloid ulcer are then described in a man and a girl who had never been out of Italy. From each, the organism described by Castellani as *Micrococcus* (*Coccobacillus*) *mycotoides* was isolated. In the first case, the best therapeutic results were obtained with simple boric fomentations : in the second, the course and treatment are not mentioned.

H. J. O'D. Burke-Gaffney

MISCELLANEOUS DISEASES

DE MESQUITA, A. P. Ainhum. Alguns dados sôbre seu estudo. Analogias com o mal perfurante plantar. [**Ainhum. Analogy with Perforating Ulcer of the Sole.**] *Hospital.* Rio de Janeiro. 1951, Mar., v. 39, No. 3, 335–48, 6 figs. [32 refs.]

The word " ainhum " was adopted by SILVA LIMA in 1867 when he first described the condition, because it was the native term and signified merely a

" constricting ring". There have been many hypotheses as to its cause, but the aetiology remains obscure. Various suggestions include trauma, heredity, parasitism (filaria, *Tunga penetrans*, etc.), congenital deformity, sclerodermia, yaws, leprosy and others. Leprosy has been considered because signs of leprosy were, at all events might be, seen in patients with ainhum. A local ancient Portuguese name for the condition was *quigila*, meaning something loathsome, or *gafeira*, which was given to scab or mange and also to leprosy, but anaesthesia and muscular atrophy, though features of mutilating leprosy, are not characteristic of ainhum.

The patient whose case is specially referred to in this paper was a man of 45 years, from Rio de Janeiro, with ainhum of the little toe of the right foot where the digit was almost severed and the condition had been progressing for 21 years, and less marked on the left foot where the disease had started 3 years ago. Wassermann and Kahn reactions were both positive. He showed no clinical signs of leprosy and he denied having had any contact with the disease, but the Mitsuda test gave a 2-plus after 48 hours and a late 4-plus after 21 days. The author infers from this that " ainhum is an atypical interdigital form of perforating ulcer of the sole ". *H. Harold Scott*

Enos, W. F. & Holmes, R. H. **Malignant Melanoma in the Tropics.** *Amer. J. Path.* 1951, May–June, v. 27, No. 3, 523–35, 7 figs. on 2 pls.

" Among the 16 cases of malignant melanoma reviewed for this study, 9 occurred in Negroes. All of the neoplasms in Negroes arose on the lower extremities, 8 of them on the foot. When the primary was on the foot of an elderly Negro, the neoplasm remained localized or did not metastasize beyond the inguinal nodes.

" The histologic pattern of certain senile melanomas is similar to that of the juvenile type, and an apparent similarity in behavior has been noted.

" The prognosis in malignant melanoma is not always so hopeless as many believe. Clinical evaluation depends on careful consideration of the factors of age, location, and race."

Fakaçelli, N. M. & Konstantinidu, Sofia. Le favisme en Turquie. [**Favism in Turkey.**] *Acta Med. Turcica.* 1951, June, v. 3, Nos. 1/2, 149–59. [38 refs.]

Favism, poisoning from eating the bean or inhaling the pollen of *Vicia faba*, seems to be rare in Turkey. The authors refer to three cases reported from the clinic of Professor Eckstein at Ankara and two of their own at Istanbul. All were in children under the age of 5 years and in all the symptoms were typical : vomiting and diarrhoea of sudden onset, with anaemia, subicterus and the passing of dark-coloured urine. The paper is mainly taken up with notes of, or references to, cases recorded from Greece, Italy, Sardinia and Sicily.

H. Harold Scott

Mitra, H. N. **Observations on Argemone Oil and Detoxicated Argemone Oil.** *J. Indian Med. Ass.* 1951, June, v. 20, No. 9, 315–16.

The toxic effects of Argemone oil, the cause of epidemic dropsy, have been ascribed to two alkaloids, sanguinarine and dihydrosanguinarine and it was thought that if these were removed the contaminated mustard oil might be free from danger. The author, by experiments on guineapigs, has shown, however, that the oil, even after these alkaloids have been extracted, is still toxic,

though much less so than the total oil, in that the signs of acute glomerulonephritis were not set up. This is merely a preliminary note ; the subject is to be pursued and, doubtless, a further report will appear later.

H. Harold Scott

PROTOZOOLOGY : GENERAL

VERLINDE, J. D. & MAKSTENIEKS, O. Toxoplasmosis in Nederland. [**Toxoplasmosis in the Netherlands.**] *Nederl. Tijdschr. v. Geneesk.* 1951, July 14, v. 95 (iii), No. 28, 2050–59, 1 fig. [10 refs.]

The English summary appended to the paper is as follows :—

" Among 172 patients suspected of toxoplasmosis, toxoplasma was repeatedly demonstrated in the ventricle fluid of seven newborn infants suffering from congenital toxoplasmosis, as well as in four of those patients in the blood also, during a period varying individually from 6 to 199 days after birth. The development of cytoplasma-modifying and complement-fixing antibodies and their significance for diagnostics are discussed. A positive dye test (titer below 1 : 100) was found in 63 per cent of 853 sera of persons not suffering from toxoplasmosis ; the highest percentage of positive sera occurred in adults."

RIEGER, H. Augensymptome der erworbenen Toxoplasmose der Erwachsenen. [**Eye Affections in acquired Toxoplasmosis in the Adult.**] *Med. Klin.* 1951, July 20, v. 46, No. 29, 792–6.

Certain ophthalmic conditions in infants have been ascribed to maternal toxoplasmosis—nystagmus, strabismus, microphthalmos, persistent membrana pupillaris, congenital cataract, pseudoglioma, optic atrophy, chorio-retinitis and pseudocoloboma. The author puts forward the idea that central exudative retinitis such as was seen in Vienna in 1937–39 and retinal changes reported in Hamburg and Tübingen may have been due to toxoplasmosis acquired in adult life. Proof of this must await more reliable serological diagnostic methods.

H. Harold Scott

ENTOMOLOGY AND INSECTICIDES : GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

JENKINS, D. W. & HASSETT, C. C. **Dispersal and Flight Range of Subarctic Mosquitoes marked with Radiophosphorus.** *Canadian J. Zool.* 1951, June, v. 29, No. 3, 178–87, 14 figs. (12 on 2 pls.) [14 refs.]

See also p. 859, BRUCE-CHWATT & FITZ-JOHN, **Mosquitoes in Crab-Burrows on the Coast of West Africa and their Control.**

GRJEBINE, A. Moustiques du Moyen-Congo. [**Mosquitoes of the Middle Congo.**] *Bull. Inst. d'Études Centrafricaines.* 1950, No. 1, 25–48.

This paper consists of notes on the larvae, adults and sometimes the eggs of 64 species of mosquitoes collected in three places in the Middle Congo, Brazzaville, Pointe-Noire and Dolisie. The notes are chiefly concerned with the breeding places and the distribution of the species with occasional references to morphology.

H. S. Leeson

MOHAN, B. N. **Certain Uncommon Habits of** *Culex bitaeniorhynchus* **(Type Form).** *Indian J. Malariology.* 1950, June, v. 4, No. 2, 167–73, 2 figs. on pl.

MORTENSON, E. W. **The Use of Sodium Hypochlorite to Study** *Aedes nigromaculis* **(Ludlow) Embryos. (Diptera : Culicidae.)** *Mosquito News.* 1950, Dec., v. 10, No. 4, 211–12, 1 fig.

The author reports that a solution of 5 per cent. sodium hypochlorite will dissolve and destroy a mosquito egg (*Aëdes nigromaculis*) in about six minutes. He suggests that the technique, modified, enlarged and refined, might prove useful in embryological studies and speculates whether it might be developed to provide a control measure. *H. S. Leeson*

MADWAR, S. & ZAHAR, A. R. **Preliminary Studies on Houseflies in Egypt.** *Bull. World Health Organization.* Geneva. 1951, v. 3, No. 4, 621–36, 10 figs.

The authors used their own modification of the SCUDDER fly grid [see *Bulletin of Hygiene*, 1947, v. 22, 653] to obtain estimations of the fly population in parts of Egypt. They used the same size grid for both indoor and outdoor situations (80×80 cm. with 15 strips), made three counts daily between 9 and 10 a.m., between noon and 1 p.m. and between 3 and 4 p.m. instead of consecutive counts at shorter intervals and they were continually on the lookout for more attractive sites for their grids. The number of grids was not strictly adhered to, but worked out roughly at about 10 to 15 grids per 1,000 houses or less with an additional 5 grids for every 1,000 houses thereafter. It was recognized that the method has no statistical significance and that the personal factor was involved but it enabled a general comparison to be made.

The results of the counts are given in several tables and discussed and then an account is given of the control methods tried. Preventive measures are so impracticable in present conditions that reliance must be placed on chemical control. But residual DDT sprayed on walls of houses at a rate of 7·5 per cent. and 3 gm. per square metre lasted only 6 weeks or less at Tersa. Tried against the flies at Cairo sewage farm (5 per cent. at 2 gm. per square metre) it was again ineffective. BHC and chlordane were no more successful than DDT in heavily infested areas.

The authors attribute the failure of DDT residual sprays to resistant strains of flies, to inability of the films to cope with such dense populations, to the habit of *Musca domestica vicina* of resting on horizontal surfaces, and to its preference for resting on foliage in the summer time.

Dusting of the breeding places with Gammexane at intervals of 10 to 15 days to kill gravid females and newly emerged flies is to be tried, and further investigations are being made to determine dosages and intervals between treatment. *H. S. Leeson*

MILLER, L. A. **Observations on the Bionomics of some Northern Species of Tabanidae (Diptera).** *Canadian J. Zool.* 1951, June, v. 29, No. 3, 240–63, 13 figs. (8 on 2 pls.) [23 refs.]

FAIN, A. & FALAISE, A. Myiases des fosses nasales et du sinus maxillaire produites par *Lucilia cuprina* Wiedemann, au Ruanda-Urundi. [**Myiasis of the Nasal Fossae and Maxillary Sinus caused by** *L. cuprina* **in Ruanda-Urundi.**] *Ann. Soc. Belge de Méd. Trop.* 1951, Apr. 30, v. 31, No. 2, 307–9.

PARROT, L. Notes sur les phlébotomes. LXII. *Phlebotomus dubius, Phlebotomus antennatus* var. *cinctus* et leur distribution géographique. [**Notes on** *Phlebotomus*. **LXII.** *P. dubius, P. antennatus* **var.** *cinctus*, **and their Geographical Distribution.**] *Arch. Inst. Pasteur d'Algérie.* 1951, June, v. 29, No. 2, 129–33, 2 figs. [15 refs.]

DE MEILLON, B. **The Madagascar Siphonaptera.** Reprinted from *Mém. Inst. Scient. Madagascar.* Ser. A. 1950, v. 4, No. 1, 67–73.

CHOW, C. Y. & HUANG, T. C. **The Identification of Known Species of Taiwan (Formosan) Fleas (Insecta, Siphonaptera).** Reprinted from *Quart. J. Taiwan Museum.* 1950, v. 3, No. 3, 113–22, 28 figs. on 3 pls.

A key is given for the identification of 11 species of fleas so far recorded from Taiwan (Formosa). The important differential morphological characters are stated and illustrated ; host records and geographical distribution are also given. *H. S. Leeson*

WORLD HEALTH ORGANIZATION. TECHNICAL REPORT SER. No. 34. **Expert Committee on Insecticides. Report on the Second Session. Geneva, 4–11 October 1950.** 82 pp., 8 figs. Geneva : 1951, May. [4*s.* 3*d.* ; $0.55.]

To prevent the dissemination of disease-carrying mosquitoes, the Committee have given consideration to disinsectization measures. They give a fairly complete specification of the methods of treating aircraft, with the recommendation that an aerosol should be applied before take-off, with all luggage and freight loaded, but without passengers. The aerosol should be generated from a concentrate containing 0·4 per cent. pyrethrins and 3 per cent. DDT, and this should be dispersed at the rate of 10 gm. per 28 cubic metres (1,000 cu. ft.). (Other "equally effective" insecticidal mists may also be used.) The aircraft is to be kept closed for at least 5 minutes after treatment.

Disinfestation in flight is not recommended ; but if there is any reason to suspect the presence of noxious insects, the treatment may be repeated at the airport on arrival, before the passengers alight.

For the disinsectization of ships, a similar aerosol treatment may be effective ; but the Committee need further experimental and observational data before they can prepare a full specification. They point out that, for large ships, treatment as a routine may be impractical and may have to be replaced by inspection for mosquitoes ; on small ships, however, disinfestation is cheaper and easier than inspection. Information on the cost and time consumed on inspection and disinfestation of ships in Sardinia and Cyprus is given in the appendix.

Nearly all the rest of the report (*i.e.*, five-sixths of the total) is made up of detailed specifications of insecticides, insecticide-sprayers (knapsack and hand sprays), and test procedure for verifying chemical and physical details of the specification. *J. R. Busvine*

HARRISON, C. Mary. **Inheritance of Resistance to DDT in the Housefly,** *Musca domestica* **L.** [Correspondence.] *Nature.* 1951, May 26, 855–6.

Insecticide-resistance in the housefly is known to be an inherited character ; but, in spite of numerous papers on this phenomenon, there appears to be little reliable information about the genetic mechanism involved. BRUCE and DECKER [*Bulletin of Hygiene*, 1950, v. 25, 825] carried out some crossing experiments between resistant and susceptible strains and investigated the levels of

resistance in the F1, F2 and F15 generations of the progeny. They found an intermediate resistance in all three, suggesting a multiple factor inheritance. However, their experiments involved mass matings which are less sound than cross matings with individual pairs.

The author of this paper has mated four pairs of flies (two reciprocal crosses of DDT-resistant and normal individuals) and reared the progeny to the F2 generation. Resistance to DDT was measured by the time before paralysis in a beaker coated with DDT. This permits assessment of the resistance of every individual in a population sample.

The results of all four crosses gave similar results. Flies of the F1 generation were nearly, though not quite, as susceptible as normal flies. There were no individuals with a resistance comparable with the resistant parent. A clear-cut segregation of susceptible and resistant flies was evident in the F2 generation, the proportion of susceptible individuals being approximately 75 per cent. in each case (*i.e.*, 3 : 1).

A back cross of a female fly of the F1 generation with a resistant male gave a segregation in a 1 : 1 ratio.

These facts are all consistent with the view that resistance to the paralysis caused by DDT is governed by a single factor inheritance. The susceptible character is, apparently, dominant, though the F1 results suggest that the dominance is not complete.

It is suggested that the " decline in resistance " reported by several workers for DDT-resistant strains maintained in the laboratory in the absence of DDT, may be due to increase in the proportions of susceptible and heterozygous individuals in the population as compared with the (homozygous) resistant flies.

J. R. Busvine

Lindquist, A. W., Roth, A. R., Yates, W. W., Hoffman, R. A. & Butts, J. S. **Use of Radioactive Tracers in Studies of Penetration and Metabolism of DDT in House Flies.** *J. Econom. Entom.* 1951, Apr., v. 44, No. 2, 167–72.

Experiments with radio-active DDT (containing C^{14}) were made to investigate the penetration and chemical degradation of this insecticide in normal and resistant house-flies. In some tests, DDT in acetone solution was applied to the backs of the flies ; in others the flies were confined in a glass chamber coated with 5 mgm. DDT per square foot. After 24 hours, the DDT was removed from the flies, first from the exterior by washing in acetone, secondly from the interior by extracting from macerated flies. The quantities inside and outside the flies were estimated by a Geiger counter. Flies to which 15 μgm. DDT had been applied were found to contain about 2 μgm. DDT internally and about 10 μgm. on the outside. Flies killed by the DDT were extracted separately from survivors, but there was little or no difference in the result ; however, if the flies were killed with boiling water before application of the DDT, 13·4 μgm. were found externally and only 0·3 μgm. had penetrated inside. The flies which had been confined in a chamber treated with DDT contained about 0·2 μgm. DDT internally and 0·05 μgm. DDT externally. This treatment, like the acetone application, had killed about 50 per cent. of the flies ; but, it will be noted, the flies only contained a tenth of the amount of DDT internally when they had picked it up through the feet.

These estimations from radio-activity may include, of course, both DDT and its degradation products DDE and DDA. Other authors have shown that degradation of DDT occurs in resistant house-flies. To check this, the toxicity to mosquito (*Aëdes*) larvae of extracts obtained as described above was compared with the quantities of DDT to be expected from the radio-activity. In all cases, the toxicity was considerably lower than indicated by the radio-activity

and the difference was assumed to be due to degradation of the DDT to non-toxic metabolites. On this basis, it was calculated from a series of tests that 60 to 70 per cent. of the internal DDT was degraded, whether it had originally been applied dorsally or had been absorbed through the feet. Similar tests with normal susceptible flies gave comparable results, suggesting that the faculty of metabolizing DDT is not confined to the resistant flies.

J. R. Busvine

Skerrett, E. J., Stringer, A. & Woodcock, D. **The Insecticidal Action of DDT.** *Biochem. J.* 1951, July, v. 49, No. 2, Proc. Biochem. Soc. xxviii-xxix.

Travis, B. V. & Smith, C. N. **Mosquito Repellents selected for Use on Man.** *J. Econom. Entom.* 1951, June, v. 44, No. 3, 428–9.

The authors give some data on repellents effective against mosquitoes and safe for use in man. The effectiveness of many of them against different species is being reported elsewhere.

The repellents listed have little or no odour and remain effective much longer than such essential oils as citronella. However, they show great individual variation in effectiveness. Tests with repellents used by the Forces in the late war have shown that mixtures have a wider range than any single repellent and that mixtures of three repellents have a wider range and longer effective period than those containing only two.

Most of the effective repellents dissolve paints, varnishes and many plastics and should be used with caution around these materials. They cause no damage to cotton or wool fabrics, but cause some smarting on mucous membranes. They usually cause temporary warmth of the skin, especially when it is moist. Some persons are allergic to some of the materials.

In a table are listed 14 mosquito repellents and 12 mixtures of repellents considered to be safe for use on man. Comparative results are given, the test insects being 3 species of *Aëdes* and *Anopheles quadrimaculatus*. " Repellent time " was the time from application to the first bite.

The three most promising single repellents against the *Aëdes* species were propyl N,N-diethylsuccinamate, Repellent 6–12 (2-ethyl-1,3-hexanediol) and dimethyl carbate. Dimethyl phthalate was the most effective against *Anopheles quadrimaculatus*.

As only a few tests were made with most of the mixtures, no definite conclusions can be drawn. Those containing dimethyl carbate gave good protection in two tests against *Aëdes aegypti* and an Alaskan species of *Aëdes*. The mixture containing Repellent 6–12 was the most thoroughly tested and showed a high degree of effectiveness against all the species used.

In addition to those mixtures listed by the authors, satisfactory results have already been obtained with formulations containing 1 part each of dimethyl phthalate, Indalone and Repellent 6–12 and those containing 2 parts of dimethyl phthalate and Repellent 6–12 or dimethyl carbate.

H. J. O'D. Burke-Gaffney

Robertson, R. S., Jr. & Gaines, J. C. **The Toxicity of certain Organic Insecticides to different Strains of House Flies.** *J. Econom. Entom.* 1951, Feb., v. 44, No. 1, 114–15, 1 fig.

Gersdorff, W. A. & Mitlin, N. **Relative Toxicity of Allethrin Analogs to House Flies.** *J. Econom. Entom.* 1951, Feb., v. 44, No. 1, 70–73.

DAVID, W. A. L. **Insecticidal-Action Studies with Bisdimethylaminophosphonous Anhydride containing ^{32}Phosphorus.** *Ann. Applied Biol.* 1951, June, v. 38, No. 2, 508–24. [14 refs.]

LORD, K. A. & POTTER, C. **Studies on the Mechanism of Insecticidal Action of Organo-Phosphorus Compounds with particular reference to their Anti-Esterase Activity.** *Ann. Applied Biol.* 1951, June, v. 38, No. 2, 495–507, 1 fig. [12 refs.]

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

CHARTERS, A. D. **The Effect of Climate on the Health of Europeans in the Kenya Highlands.** *East African Med. J.* 1951, Feb., Apr. & May, v. 28, Nos. 2, 4 & 5, 41–9 ; 174–88 ; 204–13. [Numerous refs.]

Morbidity statistics are discussed in the first part of this report. The figures reviewed have been drawn from a total of 2,864 Europeans (2,100 adults and 764 children) who were under the author's care during 9½ years of general practice in the Nakuru district (altitude 5,800 to 9,000 ft.). Most of these had their permanent home in this district. Observations on schoolchildren were mainly derived from nine years' work as Medical Officer to two schools at Turi (8,000 ft.) having together 150 children, boys and girls, with ages ranging from 5 to 18 years.

Five tables are given and analysed.

1, cases at Nakuru ; 2, cases of certain diseases with periods of residence in East Africa of over 20 and under 5 years before first consultation ; 3, comparative statistics per 1,000 population over the age of 16 for Nakuru and for England and Wales ; 4, comparative statistics for peptic ulcer, diabetes and active tuberculosis per 1,000 population at Nakuru and in England and Wales for patients receiving priority food allowances : for the first group statistics are over nine and a half years at Nakuru and for the second they are over a stated period ; 5, comparative statistics per 1,000 population for Nakuru and for Stirlingshire Hospital admissions.

The author makes the following observations :—

1. Migraine, asthma, other allergic disorders and fat dyspepsias appear to have a high incidence at Nakuru.

2. Hypertension, gall-bladder affections, nasal sinus infections and typhoid fever have a higher incidence at Nakuru than elsewhere.

3. Psychoses, disseminated sclerosis, pernicious anaemia, rheumatic fever and heart disease, rheumatoid arthritis, scarlet fever, diphtheria and tuberculosis show greater incidence in Great Britain.

4. Diseases showing little difference include cerebral vascular lesions, diabetes, appendicitis, peptic ulcer, cataract and abortions. Scarlet fever appears to be very rare in East Africa. The author admits that the Nakuru figures are too small for a reliable estimate and are merely intended as a guide.

Five main factors are discussed in the second part of the paper.

1. *Warm external temperature.*—In East Africa this varies greatly with the altitude, the mean temperature falling from 80°F. at the coast to about 56° at 9,000 ft. At Nakuru over a period of 14 years the figures were : mean annual maximum 79·3°F., mean minimum 49·9°, highest maximum 92·9°, lowest minimum 38·0°. A warm temperature, by lowering peripheral resistance, causes a fall in blood pressure, and this is probably in part responsible for improvement in cases of hypertension on descent to the warmer coastal regions. Most authorities, but not all, consider that the blood pressure tends to be

lower in the tropics than in temperate zones. Increased perspiration leads to heavy salt losses which must be replaced in the diet. Lack of salt causes lassitude, anorexia and even more acute symptoms, *e.g.*, fireman's cramp. Some authorities think that the lassitude so often found in inhabitants of warm climates is the result of lack of salt. It is believed that the sweat glands in the Africans, and other natives of tropical climates, are more numerous than in Europeans. A general lymphatic hyperplasia is quite commonly observed in Kenya children.

2. *Ultra-violet light.*—Ultra-violet light penetrates only a short distance into the skin and causes erythema, thickening and pigmentation of the skin. It is believed that only rays with wavelengths over 4,500 A.U. can penetrate more than two mm. into the skin. Ultra-violet light has a very important action by its power of converting dehydrotachysterol into vitamin D, this no doubt being the cause of the rarity of rickets in East Africa. The light also is an efficient sterilizing agent for most bacteria and viruses. On the other hand excess of ultra-violet light can be detrimental to pulmonary tuberculosis, in which disease haemoptysis may be precipitated.

3. *High altitude.*—The most important effects of high altitude are anoxaemia owing to the lowered oxygen tension, lessening of the alkaline reserve in the body and rise in the pulse rate and blood pressure, but there appears to be a difference of opinion among various workers with regard to the effect of altitude on blood pressure. Nearly all the observations and experiments quoted refer to altitudes over 10,000 ft. and very few Europeans in Kenya live above this level. Out of 2,100 adult patients at Nakuru, 72 suffered from hypertension, *i.e.*, a diastolic blood pressure of 100 mm. Hg. or more, a figure equivalent to 34 per thousand of the adult population. The author poses the question whether under conditions of low oxygen tension which occur at high altitudes, excessive amounts of renin or other vaso-excitor substances may be liberated from the kidneys. It would appear that even moderate altitudes may contribute to mental instability by the lessening of oxygen tension. The author feels that the main effect of altitude in Kenya as regards Europeans is one of benefit. [Does this refer to those coming from tropical coastal regions or from low altitudes in temperate climates ?] From comparison of figures in Nakuru and Stirlingshire there would appear to be no appreciable difference between the incidence of abortions in Kenya and Great Britain.

4. *Low average humidity.*—The average humidity in Europe is 79 per cent. compared with one in Kenya of 77 per cent., although at Kabete this has fallen to 11 per cent. and in Nakuru in February to 28 per cent. Nasal sinusitis appears to be common in Kenya and a possible explanation may be drying of the mucous membranes, which cannot adequately carry out their protective functions.

5. *Exposure to foreign substances.*—Ingestion of tropical fruits and inhalation of unusual pollens may increase the tendency to allergic diseases in Kenya. Five patients in this series showed marked allergy to bee stings, one dying within a few minutes of being stung. The author notes that allergic affections appear to be very common in Kenya, while the frequent eosinophila found among European children [this *Bulletin*, 1950, v. 47, 397] supports this belief.

Relative incidence of some other diseases are discussed in the third part of the report.

Disorders of fat metabolism appear to be commoner in Kenya than in England. Pale stools in children, often with cyclical vomiting, migraine and gall stones, are grouped under this heading, as the cyclical vomiting is often succeeded by migraine in adult life, and sufferers from migraine often develop gall stones later on. It is noted that in the case of migraine there is often a tendency for the blood cholesterol to be above normal. The author suggests that these

abnormalities of metabolism may be due partly to consumption of fats in excess of physiological needs in a warm climate.

Rheumatic fever and rheumatoid arthritis are less prevalent than in England. Gout is not uncommon in the Kenya Highlands, although TROWELL (*East African Med. J.*, 1947, v. 24, 346) states that in seventeen years of practice he has not seen a single case among Europeans in East Africa. [The abstracter has seen one typical case of this disease in a European in Uganda.]

The incidence of cancer shows no significant difference. Goitre, which tends to occur at high altitudes, is not abnormally common in the Nakuru district, but exophthalmic goitre appears commoner than in England. The author has previously pointed out that psychoses appear to be less frequent in the Nakuru district, but CRITCHLEY (*Brit. Med. J.*, 1944, v. 2, 209) noted that, among civil servants, psychiatric disorders were responsible for 1 in 3 and alcoholism for 1 in 24 invalidings from East Africa between 1930 and 1940. But he adds, very truly, " The climatic factor would be supported if one could demonstrate that the same psychiatric features occur in tropical civilians whose homes and families are on the spot ". In Kenya, girls begin to exceed boys in height and weight at the age of 9 (in London the corresponding age is 11), and it is not until 17 that boys again become heavier than girls. The author considers that the climatic factor responsible is probably connected with heat rather than altitude. Observations in Australia and New Zealand at altitudes not above 700 feet are said to confirm this. There appears to be some evidence to show that the age of onset of menstruation tends to be retarded by tropical heat.

The author considers that the problem is one of adjustment of life to a tropical temperature by the design of suitable houses, living conditions and habits generally. Lastly it is emphasized that many other aspects of climate require careful investigation. Such factors include the great diurnal ranges of temperature, averaging 25° to 30°F. over the Kenya Highlands, the small variation of mean monthly temperature (averaging about 6°F.) and the great variations in humidity, which frequently reaches saturation in Nairobi in the early morning, but may fall to 10 per cent. in the middle of the day during February and March. *C. F. Shelton*

EAST AFRICA HIGH COMMISSION. **Virus Research Institute Annual Report 1950** [HORGAN, E. S., Director]. pp. ii+32. [19 refs.] 1951. Nairobi : Govt. Printer.

The Yellow Fever Research Institute was founded at Entebbe, Uganda, in 1936. It was established as a result of decisions reached between representatives of the International Health Division of the Rockefeller Foundation and the Colonial Office. At the end of 1949 the Rockefeller Foundation officially terminated its connexion and on January 1st 1950 the Institute was renamed the Virus Research Institute and became a unit of the Colonial Medical Research Service. This is the first annual report of the new Institute. The research programme is still primarily concerned with yellow fever but the scope has been extended to include research into rickettsial infections and encephalitic diseases. In addition the Institute will be ready at any time to investigate known or suspected virus diseases which may become of importance in East or Central Africa. It is not the intention to engage on fundamental research on the physico-chemical aspects of viruses, but rather to concentrate on investigations into practical field problems.

Research on the yellow fever virus included the cyclical transmission of the virus through the grivet monkey *Cercopithecus aethiops centralis*, and the mosquito *Aëdes africanus* ; a demonstration that vaccination with 17D chick

embryo virus is feasible by scarification ; and a useful note that there is no evidence of a heat-labile non-specific substance having any influence on the results of yellow fever protection tests.

During the year, 2,407 sera were tested for yellow fever antibody.

The detailed epidemiological survey of yellow fever in the forests of Uganda was continued ; the picture which is emerging is one of incredible complexity.

Other viruses studied were the Uganda S, the M 1032 and the Mengo-encephalitis virus.

In co-operation with the Poliomyelitis Research Centre, Baltimore, U.S.A., small pools of sera were collected from isolated communities in Uganda and Somaliland for isolation and identification of poliomyelitis virus strains. All the virus isolations will be made at Baltimore.

Work on rickettsiae has been mainly concerned with a comparison of complement fixation tests with Weil-Felix tests in cases of murine and tick typhus. A study was also made of the specificity of complement-fixing antigens prepared from strains of epidemic, murine, tick typhus and rickettsialpox rickettsiae. In the case of local tick typhus very similar results were given by antigens prepared from strains of rickettsiae of Rocky Mountain spotted fever, South African tick-bite fever, and rickettsialpox. No cases of Q fever have yet been reported in East Africa. One strain of tick typhus was isolated during the year from a clinical case but unfortunately it was lost during passage through guineapigs. The report concludes with details of entomological and zoological work carried out by members of the staff of the Institute.

A bibliography shows that 19 papers were prepared for publication during the year. *Forrest Fulton*

TIMTSCHINOV, N. Einige Bemerkungen über die zoologische Nomenklatur in der Medizin. [**Observations on Zoological Nomenclature in Medicine.**] *Deut. med. Woch.* 1951, June 15, v. 76, No. 24, 807–8.

The author remarks that confusion is likely to arise, and has in fact arisen, from unsettled nomenclature in medical parasitism. He states—and all will agree with him in this—that confusion has resulted from several names having been given to the same parasite and from the same name having been bestowed on different parasites. As examples, he cites " malaria tropica " as being ascribed to plasmodia named *P. falciparum* and *P. praecox*, and *Oxyuris* being retained for the parasite of horses, but changed to *Enterobius* for that of man ; for *Taenia nana* becoming *Hymenolepis nana ; Taeniarhynchus mediocanellatus* becoming *Taeniarhynchus saginatus*, then *Taenia mediocanellata* and *T. saginata ; Bothriocephalus latus* becoming *Dibothriocephalus* and later *Diphyllobothrium*. [He might have brought forward many other examples and synonyms ; for example, the malaria parasite has changed its generic name as often as a filmstar her surname, from *Oscillaria malariae* (Laveran), to *Haematozoon malariae* (Laveran), *Haematophyllum* (Metchnikov), *Plasmodium* (Marchiafava and Celli), *Haematomonas* (Osler), *Haemamoeba malariae* for the quartan parasite, and *Haemamoeba vivax* for the tertian, *Haemamoeba praecox* for the pigmented quotidian parasite and *Haemamoeba immaculata* for the unpigmented, *Laverania malariae* for the crescentic form (Grassi and Feletti) ; also for *Trichuris trichiura* its other name of *Trichocephalus dispar*, and so on.] The remedy consists in abiding by the rules internationally agreed upon for medical nomenclature. *H. Harold Scott*

BOOK REVIEWS.

CHAUSSINAND, R. **La lèpre.** [Leprosy.] 212 pp., 75 figs. 1950. [Paris.] : L'Expansion Scientifique Française. [19s.]

In the preface to this handbook on leprosy it is pointed out that the penetration of the white races during the 19th and 20th centuries in countries where leprosy is endemic, and the improvement of communications, have led to the importation of patients from tropical to temperate countries. Fortunately the conditions in most of these temperate zones are not favourable to the spread of leprosy. But with the increased number of cases it is important that medical practitioners in France should be in a position to diagnose the disease and should know the most modern information with regard to it. Also in the overseas lands of Indo-China, Madagascar, West Africa and Pondicherry it is necessary that medical students should have a practical knowledge of leprosy. There are large and learned textbooks on the subject, but what is required is a book like this which contains in a practical form the latest teaching about the clinical features, classification of the principal forms, and the means of diagnosing and treating the disease. From his fifteen years' experience in the Pasteur Institute in Saigon, where he was in charge of the leprosy work, and from his position at the Pasteur Institute in Paris, where he treats the cases imported into France, the author has been able to produce a clear, concise and readable little volume. It is beautifully illustrated with photographs of clinical lesions and of microscopic sections. Chapters on history, geography, Hansen's bacillus, and similar diseases in animals are followed by a very thorough section on aetiology. After a section on immunity there is a well-arranged series of chapters on the clinical features and evolution of the lesions. The author considers that the primary lesion in leprosy is always in the skin, though the original skin lesion may not always be a visible one.

Under prophylaxis there is a particularly interesting section on the relationship of tuberculosis and leprosy. Several writers have suggested that there may be some immunological connexion between the gradual increase of tuberculosis and the gradual decline of leprosy, as noted in many countries. Against this has been objected the fact that tuberculosis in leprosy cases of the lepromatous type is generally severe and rapidly fatal, neither does its progress in any degree cause a diminution of the leprosy infection. The author, however, relates his own experience, that an injection of tubercle bacilli killed by heat in a patient with leprosy but uninfected with tuberculosis causes a reaction if he is lepromin-positive but not if he is lepromin-negative, suggesting that the lepromin-positive case is allergic to and therefore resistant to tuberculosis. He considers that if the one disease has this effect upon the other it would be a logical procedure to use the premunition of BCG in regions where there is at present a campaign against leprosy and where an increase of tuberculosis is threatened.

There is an adequate section on sulphone therapy, the writer having a preference for the "*sulfone-mère*" (DDS), which with carefully regulated doses he does not find toxic.

An adequate bibliography is given.

It is a matter for regret that such a carefully prepared and useful book should not have better binding ; for a book in everyday use, as this is sure to be, at least a strong cloth binding is necessary. *Ernest Muir*

KOUWENAAR, W., VAN STEENIS, P. B. & WINCKEL, Ch. W. F. [Edited by]. **Leerboek der tropische Geneeskunde.** [Text-Book of Tropical Medicine.] pp. xvi+928, 127 figs. & 3 coloured pls. 1951. Amsterdam : Scheltema & Holkema's Boekhandel en Uitgeversmaatschappij N. V. [H.fl. 47.50]

Among a number of new books which have seen the light of day in recent years we are pleased to welcome this imposing volume from Holland. The "Leerboek" is a direct descendant of the well-known work of C. D. de Langen and A. Lichtenstein, the last edition of which appeared in 1936. Efforts to produce a satisfactory book have resulted in a symposium by a team of no less than 21 contributors under the general editorship of W. Kouwenaar, P. B. van Steenis and Ch. W. F. Winckel.

From the outset it must be understood that the *venue* is rather specialized because the subject matter deals with those maladies found in Indonesia, New Guinea and the Dutch West Indies ; consequently, several important subjects, such as African trypanosomiasis, visceral leishmaniasis (kala azar) and the relapsing fever group are omitted entirely. The reason for this is difficult to understand when *Schistosoma haematobium*, *Loa loa* and *Onchocerca volvulus*, none of which occurs in these Dutch possessions, are included.

A feature which to the reviewer appears to mar its usefulness as a teaching book for students and graduates, is the scarcity of illustrations of the main parasites. There are, it is true, three beautiful coloured plates of the human plasmodia, but no diagram of the exo-erythrocytic cycle, which could have been much more instructive than a mere list of technical names for the various stages in this complicated process.

The value of the book would be greatly enhanced, we may be sure, by inclusion of a good plate of the amoebae parasitic in man, even were they only in black and white. Here and there among the worms we find an occasional picture, but there is nothing like plain line drawings for teaching helminthology.

With the restrictions already mentioned the book is most comprehensive, embracing as it does, subjects not usually dealt with in works on tropical medicine. Within the compass of some sixteen chapters the following are described : a general review of medical practice in the tropics, human physiology under tropical conditions, general infectious diseases, such as malaria, leptospirosis, the rickettsioses, virus diseases (yellow fever, dengue, rabies and pock diseases), bacterial diseases (the typhoid group, plague, brucellosis and melioidosis) and spirillar diseases. The fourth chapter on this quasi-clinical basis deals with bacillary dysentery, amoebiasis, cholera, steatorrhoea, kwashiorkor, enteritis tropica (Porges), tropical sprue, balantidiasis and giardiasis. Worm diseases include ankylostomiasis, strongyloidiasis, Bancroftian filariasis, loiasis, schistosomiasis, clonorchiasis, fascioliasis, echinostomiasis, sparganosis, and cosmopolitan worm infections, such as ascariasis and trichiniasis. Chapter VI contains a miscellaneous collection, hunger oedema, xerophthalmia, beriberi, pellagra, nutritional anaemia and scurvy. The next chapter (VII) gives an account of Indonesian diets which should be of very great use to practitioners in those islands.

Skin and venereal diseases are lumped together in the same chapter, the latter comprise gonorrhoea, non-specific urethritis, Reiter's disease, ulcus molle, lymphogranuloma venereum, granuloma inguinale, syphilis, balanitis and phimosis.

Chapter IX deals with rhinoscleroma, sickle-cell anaemia, pyomyositis tropica, bronchial spirochaetosis and tropical eosinophilia. The effect of tropical climate upon health is the theme of the next chapter, while Chapter XI under the umbrella of geographical pathology, discusses the occurrence and clinical appearances of zymotic fevers, tuberculosis, vascular diseases, kidney,

lung and liver affections, duodenal ulcer, appendicitis, gallstones, blood diseases, diabetes, gout, amyloid disease, goitre and malignant tumours. Special chapters are devoted to children and diseases of the eye.

Welcome is Chapter XIV which describes gynaecological problems in the tropics. The book is rounded off with an account of nervous diseases, plant and animal poisons (including snake bite). There is a full index.

It will be appreciated by the recital of this summary that this new venture contains ample fare for the practitioner of medicine in the tropics for whom it is written, and in whichever direction he looks he will not be disappointed.

From the practical point of view, in a symposium by so many contributors there are bound to be some repetitions and contradictions. Thus syphilis and tuberculosis appear under more than one heading. To the student of tropical medicine, nurtured under the older traditions, the importance given to some subjects may cause mild surprise. One of these is enteritis chronica of Porges which rests upon the clinical description published in 1928. It is a chronic disturbance of the small intestine, the pathology of which is unknown, and it is probably closely allied to kwashiorkor. Bronchial spirochaetosis is another condition which is not entirely satisfactorily established, and one feels that the account does not convey the sense of full conviction of its genuineness.

Where the editing has been so excellently carried out, where the printing, paper and general format are beyond reproach and where the subject matter has been so accurately and well composed, there does not appear to be much ground for criticism. It can be asserted that it is by far the best book on this subject in the Dutch language and therefore it should have a special appeal to Dutch doctors—and there are many—who take a pride in their country's achievements in the tropics—achievements which have contributed so much to the welfare of their nation and of the races with whom they have been brought into contact. Taking into consideration the size of their country and the comparatively small number of doctors who have specialized in tropical diseases, Dutch contributions have been disproportionately important. Should there be any doubt about such a claim a brief perusal of this book should convince even the most sceptical. *Philip Manson-Bahr*

VERE HODGE, E. H. [C.I.E., B.A., M.D. (Cantab.), F.R.C.P. (Lond.), I.M.S. (retd.), etc.] **Birch's Management and Medical Treatment of Children in Tropical Countries.** With Chapters on Special Subjects by E. O'G. KIRWAN, the late J. duP. LANGRISHE, G. Ewart MARTIN & G. A. POLLOCK. 9th Edition. pp. x+412, numerous figs. 1951. Calcutta: Thacker, Spink & Co. (1933) Ltd. [*Rs.*16]

"Birch" is one of the oldest British Indian medical classics. The ninth edition by Colonel Vere Hodge issued in 1951 reflects the opinions and practice of a mature and experienced physician and will doubtless continue to act as a reliable vade mecum to mother and young doctor alike.

An attempt has been made to appeal to a wider audience by removing the reference to India from the title of the previous edition, and indeed a few notes have been included about climatic conditions in West Africa, yellow fever inoculation and schistosomiasis—but not trypanosomiasis or onchocerciasis.

It is, however, in India, Pakistan, Ceylon and Burma that this Calcutta manual will have the widest appeal. In these countries—contrary to popular belief in England—the European population is increasing. Rocketing prices are limiting the annual migration to the hills, European children are being kept out longer and in poorer conditions than obtained before the recent war.

Further, there is an ever growing interest among Indian mothers in modern methods of bringing up children and in maintaining health. "Birch" in its latest form should meet their needs.

Most physicians would now lay more emphasis on antibiotics in the treatment of pneumonia—one suspects that there have been delays in printing. The editor of such a classic as this deserves our sympathy in his valiant and successful attempt to improve the old text while keeping production costs within reasonable limits in these expensive times. *G. R. McRobert*

TREDRE, R. F. **Notes on Preservation of Personal Health in Warm Climates.** 58 pp., 23 figs. 1951. London: Ross Institute of Tropical Hygiene, London School of Hygiene & Tropical Medicine, Keppel Street, W.C.1.

Here is knowledge in a nutshell served up with the wine of mature wisdom and experience. As Prof. George MACDONALD says in the preface, the booklet is the lineal descendant of Major Cuthbert CHRISTY's notes on malarial prevention largely used in World War I. First things come first, malaria, bowel diseases and heat effects, and mental acclimatization is rightly bracketed with them. The text is delightfully free from didactic "do's" and "dont's" and gives just enough scientific information to commend its advice. The following minor suggestions would make it almost perfect :—

Make the mosquito on page 8 bow towards the east and thus maintain the clockwise turn of the illustration.

Eliminate the tsetse's vain reflection of himself on p. 26.

Mention that *Simulium* larvae hitch their wagons to crabs in order to maintain themselves in "the flowing water of turbulent streams".

Insist that the safety pin is a far better safety device for digging out jiggers than the needle.

Finally, let the Ross Institute, which gives itself a well deserved advertisement on page 51, admit just the possibility of the value of chemotherapeutic prophylaxis in the community control of malaria and trypanosomiasis.

The thin red booklet is no larger than a passport, with which it might well be kept as the constant companion of the tropical traveller.

C. C. Chesterman

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